U.S. Department of the Interior

Bureau of Land Management

January 2005

# Northeast National Petroleum Reserve – Alaska

# FINAL Amended Integrated Activity Plan/ Environmental Impact Statement

## Volume 3

**Appendices, References, Glossary, Index, and Maps**

# The BLM Today

***Our Vision***
To enhance the quality of life for all citizens through the balanced stewardship of America's public lands and resources.

***Our Mission***
To sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

***Our Values***
To serve with honesty, integrity, accountability, respect, courage, and commitment to make a difference.

***Our Priorities***
To improve the health and productivity of the land to support the BLM multiple-use mission.

To cultivate community-based conservation, citizen-centered stewardship, and partnership through consultation, cooperation, and communication.

To respect, value, and support our employees, giving them resources and opportunities to succeed.

To pursue excellence in business practices, improve accountability to stakeholders, and deliver better service to our customers.

# How this EIS is Organized




**BLM/AK/PL-05/006+1610+930**


Cover photos

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| 1 | |
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1. Lake Teshekpuk (Bureau of Land Management and Craig McCaa)
2. Snowy owl chick (Craig George, North Slope Borough, Department of Wildlife Management)
3. Whale harvest (Craig George, North Slope Borough, Department of Wildlife Management)
4. Drill rig and caribou herd (BP Exploration (Alaska), Inc.)

# Final

# Amendment to the Northeast National Petroleum Reserve Integrated Activity Plan/ Environmental Impact Statement

## Volume 3

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Prepared by

U.S. Department of the Interior, Bureau of Land Management
Anchorage, Alaska

January 2005

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# 1998 NORTHEAST RECORD OF DECISION

U.S. Department of the Interior
Bureau of Land Management

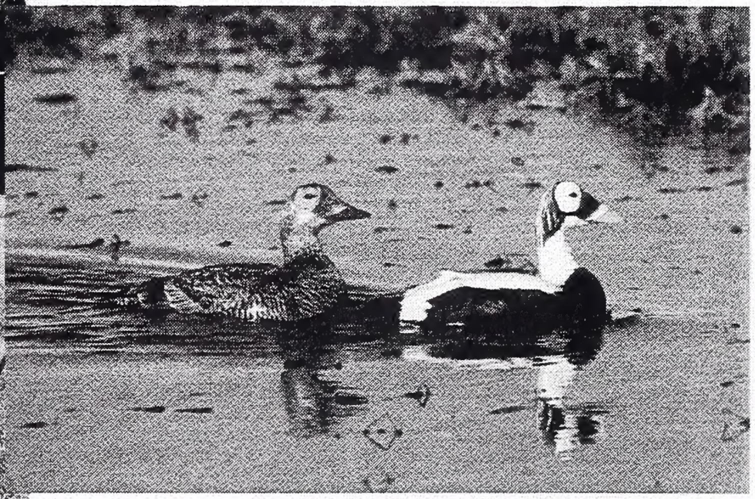
in cooperation with the
U.S. Department of the Interior
Minerals Management Service

October 1998

# Northeast National Petroleum Reserve-Alaska

# Integrated Activity Plan/ Environmental Impact Statement

## Record of Decision



## Northeast
## National Petroleum Reserve-Alaska

## Integrated Activity Plan/
## Environmental Impact Statement

# Record of Decision

Bruce Babbitt — 10/7/98

Bruce Babbitt
Secretary of the Interior

Date

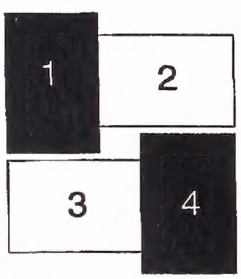
**October 1998**

Prepared by
U S Department of the Interior
Bureau of Land Management

In cooperation with
U.S. Department of the Interior
Minerals Management Service

It is the mission of the Bureau of Land Management to sustain the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations

BLM/AK/PL-99/001+3130+930




Cover photos:

1 Anne Morkill, Bureau of Land Management
*Photo of Dora Itta of Barrow*

2 © D Roby & K Brink / VIREO
*Photo of Spectacled Eider*

3 © BP Exploration (Alaska) Inc
*Photo of Exploratory Drill Rig*

4 U S Fish & Wildlife Service
*Photo of Caribou*

# Contents

# Summary

The Bureau of Land Management's (BLM) Northeast National Petroleum Reserve-Alaska (NPR-A) Integrated Activity Plan/Environmental Impact Statement (IAP/EIS) describes the future multiple-use management of 4 6 million acres of the NPR-A, consistent with existing statutory direction for its management The plan emphasizes restrictions on surface activities, consultation with local residents, and coordinated scientific studies to protect wildlife habitat, subsistence use areas, and other resources At the same time it makes approximately 87 percent of the planning area available for oil and gas leasing In reaching the decisions embodied in this Record of Decision (ROD), BLM has received extensive assistance from other Federal agencies, the State of Alaska, the North Slope Borough, and thousands of individuals and institutions who have shared their knowledge and insights about the resources and values associated with the planning area

This plan fulfills Congress's mandate in the Naval Petroleum Reserves Production Act (NPRPA) to conduct "an expeditious program of competitive leasing of oil and gas" and at the same time to protect the significant subsistence, environmental, fish and wildlife, and historic or scenic values "consistent with the requirements of this Act for the exploration of the reserve " Under the plan, important oil and gas resources, including those which may lie near the Alpine field now under construction just east of the Reserve, will be made available for leasing. Stipulations protect surface resources and subsistence activities throughout the planning area The plan also protects key surface resource and use areas identified through the planning process by strict restrictions on surface activities and, in 13 percent of the area, through a decision not to offer lands for oil and gas leasing Included among the areas receiving special protections are important habitat for waterfowl and caribou in the vicinity of Teshekpuk Lake, wildlife habitat and recreation and scenic areas along the Colville River and some of its tributaries, and subsistence use lands critical to local residents near Teshekpuk Lake and several rivers and creeks

The IAP/EIS analyzed six alternative future management plans for public comment, including the Preferred Alternative. Alternative A was the environmentally preferred alternative But because it offered no lands for oil and gas leasing, the BLM determined that it would not be appropriate for adoption because it fails to fulfill legislative mandates to provide opportunities for oil and gas development of the Reserve.

The IAP/EIS also determined that while the Preferred Alternative independent of associated cumulative effects did not reach the "may significantly restrict" threshold for impacts on subsistence applicable to section 810 of the Alaska National Interest Lands Conservation Act (ANILCA), assessed with past, present, and anticipated cumulative effects, the Preferred

Alternative did cross that threshold The plan, however, meets the legal requirements for Federal actions which may result in a significant restriction on subsistence uses; i.e. the restriction is necessary, consistent with sound management principles for utilization of the public lands; the plan involves the minimal amount of public lands necessary to accomplish the purposes of such utilization; and reasonable steps will be taken to minimize adverse impacts on subsistence uses and resources resulting from the plan.

# Decision

The plan described below is hereby adopted for future management in the northeast planning area of National Petroleum Reserve-Alaska. The plan adopted here is the Preferred Alternative presented in the *Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement* with minor clarifications and changes noted, explained, and evaluated in Appendix A. Comments offered by the public and other government agencies have resulted in these clarifications and minor modifications of the Preferred Alternative. We thank those who have helped us in this planning process through their comments.

The plan emphasizes restrictions on surface activities, consultation with local residents, and coordinated scientific studies to protect wildlife habitat, subsistence use areas, and other resources. At the same time it makes approximately 87 percent of the planning area's 4.6 million acres available for oil and gas leasing.

This decision culminates the Integrated Activity Plan/Environmental Impact Statement (IAP/EIS) process. It fulfills the National Environmental Policy Act (NEPA) requirements associated with management planning on these public lands, including making decisions on what lands to make available for oil and gas leasing It serves as the NEPA documentation for the first oil and gas lease sale Subsequent lease sales are contemplated within the portion of the planning area made available for leasing Prior to authorizing future site-specific activity on these lands or conducting any additional lease sales, the Bureau of Land Management (BLM) will conduct the appropriate additional NEPA analysis, tiering from the IAP/EIS, if appropriate.

The decision is described below and includes the stipulations in Appendix B

**Teshekpuk Lake Special Area**

***Teshekpuk Lake Surface Protection Area:*** This area is depicted in green (including the green hatched area) on Figure II.C 1 of the Final IAP/EIS reproduced here on page 3. It encompasses important goose molting areas, caribou calving and insect-relief habitat, and all of Teshekpuk Lake It is of special importance to subsistence users because of the caribou and fish resources in the area and long-standing subsistence use of the area. Within this area

- No permanent oil and gas surface occupancy will be allowed. (Note· Unless otherwise noted, reference to no permanent oil and gas occupancy would prohibit

pads, rigs, platforms, gravel roads, airstrips, gravel or other material extraction pits, and pipelines )

- No seasonal exploratory or delineation wells will be allowed.
- Ice roads, seismic activities, winter overland moves, and other nonpermanent activities other than exploratory or delineation well drilling may be authorized
- Oil and gas leasing will be allowed in the 5- to 6-mile band (hatched area on Fig II C 1) at the southern and western edge of this area. Rights to the subsurface resources under leases in this area will not include the uppermost 500 feet.
- Restrictions will be imposed on aircraft activity associated with permitted activities (See stipulations 52-55 )

***Miguakiak River:***

- No permanent oil and gas surface facilities, except essential transportation crossings (roads and pipelines), will be allowed within ½ mile of the river
- An area within 3 miles of the river is of particular sensitivity for subsistence activities and will receive special consideration within the consultation framework described in stipulation 61.

**Colville River Special Area**

***Colville River:***

- The BLM will develop a Colville River Management Plan for the Special Area in cooperation with adjacent landowners and other affected parties to address subsistence, wildlife, recreation, paleontological, and other issues Prior to launching such a plan, the agency will conduct a raptor workshop to review scientific literature on disturbance to raptors and identify potential additional mitigation measures. Creation of a Bird Conservation Area as described in Section II B.6 of the Final IAP/EIS will be explored with other landowners as part of the Colville River Management Plan.
- No permanent oil and gas surface facilities, except essential pipeline crossings, will generally be allowed within 1 mile of the west bluffs (or bank if there is no bluff) extending the length of the river in the Colville River Raptor, Passerine and Moose Land Use Emphasis Area (LUEA) (Maps depicting this and other LUEAs mentioned in this document can be found in the Final IAP/EIS, pp II-4 to II-17 )
- An area within 2 miles of the west bluff (or bank if there is no bluff) extending the length of the river in the Colville River Raptor, Passerine and Moose LUEA is of particular sensitivity for subsistence activities and wildlife and will receive special consideration within the consultation frameworks described respectively in stipulations 61 and 62.


/DATA9/FII.C.1.GRA (Color Comp)

- The Scenic Areas LUEA will be managed for Visual Resource Management (VRM) I upstream of Umiat and VRM II below Umiat, although exceptions to this management guidance will be allowed for subsistence structures and essential pipeline crossings.
- Even though the physical characteristics and associated resource values make the Colville River "eligible" for designation, the river has been determined not "suitable" for Wild & Scenic River (WSR) designation, because other landowners within the potential WSR corridor do not support this action and, without their cooperation, management as a WSR would be ineffective.

***Kikiakrorak and Kogosukruk Rivers:***

(Note: The following discussion refers only to portions of the Kikiakrorak River downstream from T. 2 N., R. 4 W., U.M. and the Kogosukruk River downstream from T. 2 N., R. 3 W., U.M.)

- No permanent oil and gas surface facilities, except essential transportation crossings, will be allowed within 1 mile of the bluff (or bank if there is no bluff) on either side of the rivers and several of the Kogosukruk tributaries.
- An area within 2 miles of the top of the bluff on either side of the rivers and several of the Kogosukruk's tributaries is of particular sensitivity for raptor nesting and will receive special consideration within the consultation framework described in stipulations 61 and 62.
- The BLM is being directed to prepare the necessary documents to add an area encompassing approximately 2 miles on either side of the rivers and the Kogosukruk's tributaries to the Colville River Special Area. The BLM will include management considerations for these areas in the Colville River Management Plan.

***Umiat Recreation Site LUEA:***

- Incorporate plans for future management of this area in the Colville River Management Plan. Emphasis is to be on supporting public health and safety.

## Other Specific Areas in the Planning Area

***Fish Creek:***

- No permanent oil and gas surface facilities, except essential transportation crossings, will be allowed within 3 miles of the creek downstream from the eastern edge of Sec. 31, T. 11 N., R. 1 E., U.M. or within ½ mile of the creek farther upstream.
- An area within 2 miles of the creek in and above Sec. 31, T. 11 N., R. 1 E., U.M. is of particular sensitivity for subsistence activities and will receive special consideration within the consultation framework described in stipulation 61.

***Judy Creek and Ikpikpuk River (in the planning area):***

- No permanent oil and gas surface facilities, except essential transportation crossings, will be allowed within ½ mile of these waterbodies.
- An area within 2 miles of these waterbodies is of particular sensitivity for subsistence activities and will receive special consideration within the consultation framework described in stipulation 61.

***Pik Dunes LUEA:***

- No surface structures, except essential transportation crossings, will be allowed.
- The BLM is being directed to prepare the necessary documents to add the LUEA to the Teshekpuk Lake Special Area.

***Deep-Water Lakes:***

- No permanent oil and gas surface facilities will be allowed in the lake bed of fish-bearing lakes in this portion of the Fish Habitat LUEA. Nor will such occupancy be allowed within ¼ mile of these fish-bearing lakes.

***Kuukpik Corporation Entitlement:***

- The BLM has asked Kuukpik to identify twice its underselection acreage. In its first oil and gas lease sale, BLM will defer from leasing those lands Kuukpik identifies.

The plan also includes decisions which apply to the entire planning area. These are incorporated in the stipulations for the plan which are listed in Appendix B. They address such topics as waste prevention, handling, and disposal; preventive measures and preparation and response to spills; ice roads and water use; overland moves and seismic work (which are allowed throughout the planning area subject to stipulations); oil and gas exploratory drilling; facility design and construction; ground transportation; air traffic; oil field abandonment; and subsistence.

The plan establishes procedures and advisory bodies to address subsistence and research (inventory and monitoring) concerns. Stipulation 61 describes a conflict avoidance procedure to address subsistence concerns with oil and gas exploration and development activities. Through it, lessees will consult with the North Slope Borough (NSB), affected communities, and the Subsistence Advisory Panel, a special body created to represent subsistence issues (See Sec. II.F.6 of the Final IAP/EIS). Under the plan, representatives from Federal, State, and NSB agencies, the oil industry, environmental groups, academia, and other interested parties will be invited to participate on a Research and Monitoring Team. This team will coordinate research and monitoring projects related to the effectiveness of stipulations and surface resource impacts. It also will seek advice from the Subsistence Advisory Panel (See

Sec. II.F.7 of the Final IAP/EIS). The team will be chartered in accordance with the Federal Advisory Committee Act.

Many of the geographically-specific restrictions listed above are also included in the stipulations. Nearly all stipulations are subject to an exception clause. Exceptions to a stipulation may be granted under strict conditions. In the event that an exception to a lease or permit stipulation is requested and before an exception may be granted, the AO shall find that implementation of the stipulation is:

1. a) technically not feasible or
   b) economically prohibitive or
   c) an environmentally preferable alternative is available, and
2. the alternative means proposed by the lessee fully satisfies the objective(s) of the stipulation.

In addition, prior to the consideration or granting of an exception to a lease or permit, all conditions and/or consultation requirements specific to a stipulation must be met. The Authorized Officer (AO) shall consult with appropriate Federal, State, and NSB regulatory and resource agencies before an exception may be granted, except in the case of an emergency. The AO's power to grant stipulation exceptions is limited to those subjects, uses, and permits over which the BLM has authority. Exceptions also may be granted in emergencies involving human health and safety.

Some decisions listed above and in the stipulations are not subject to the exception clause. These include:

1. decisions on the areas to be available or unavailable for oil and gas leasing,
2. prohibition of permanent roads connecting to a road system outside the planning area,
3. prohibitions on pipeline and road crossings in the setback area around Teshekpuk Lake and road crossings in the setback area adjacent to the Colville River, and
4. prohibitions on permanent oil and gas surface occupancy in the Teshekpuk Lake Surface Protection Area

The plan will not affect other non-discretionary BLM responsibilities mandated by Congress. Chief among these is conveyance of land to individual Alaskan Natives and to Native corporations under the Native Allotment Act and the Alaska Native Claims Settlement Act (ANCSA), respectively.

# Alternatives Considered

The *Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement* presented the Preferred Alternative and 5 other alternatives.

**Preferred Alternative:** The Preferred Alternative is nearly identical to the plan described in this Record of Decision. (See Appendix A for explanations of minor clarifications and changes.) It would maximize protection for molting geese by making virtually all of the Goose Molting Habitat LUEA unavailable for leasing. The Preferred Alternative would protect caribou calving areas in the Teshekpuk Lake Caribou LUEA by not making 48 percent of the LUEA available for oil and gas leasing (including the key caribou movement corridors), buffered by an area (30% of the LUEA) available for leasing but with no surface oil and gas activities allowed (including no exploratory drilling), and a small portion (22%) available, subject to stipulations specifically designed to limit impacts. The Preferred Alternative would make 87 percent of the planning area (4,007,000 acres and 67% of the area of high oil and gas potential) available for oil and gas leasing and allows seismic operations throughout the area subject to stipulations. The Preferred Alternative also establishes procedures and advisory bodies to address subsistence and research (inventory and monitoring) concerns.

**Alternative A:** This alternative is the No Action alternative. It reflects current BLM management of the planning area and a decision BLM has made that the 1983 EIS for leasing in the 1980s is inadequate for renewed leasing. No new oil and gas leasing would occur, no new designations such as Special Areas or Wild and Scenic Rivers would be proposed, and protection of surface resources from other activities would be provided by existing Special Area designations, Special Management Zones, and existing stipulations. Under this alternative two options exist with regard to seismic activity. Winter seismic activity could occur throughout the planning area (the existing management situation), or seismic activity could be prohibited. Alternative A is the **environmentally preferable alternative**, because it would forbid oil and gas leasing, the most likely activity to create environmental impacts. This alternative, however, was not chosen because it would not fulfill the legislative direction to make lands in the Reserve available for oil and gas development.

**Alternative B:** Alternative B would make 53 percent of the planning area available for oil and gas leasing while emphasizing protection of specific surface resources. With the exception of the Kuukpik Corporation Entitlement LUEA, none of the LUEAs would be made available for oil and gas leasing. Leasing in the Kuukpik Corporation Entitlement LUEA would be postponed until the corporation's entitlement has been satisfied. Aboveground

pipelines could cross all lands except the Potential Colville Wild and Scenic River LUEA, and all lands would be available for seismic studies. Protective measures include applying the stipulations described in the Draft and Final IAP/EISs, recommending a portion of the Colville be included as a wild river in the WSR System, proposing a Bird Conservation Area along the Colville River, designating the Ikpikpuk Paleontological Sites LUEA as a new Special Area to protect paleontological resources, and adding the Pik Dunes LUEA to the Teshekpuk Lake Special Area. BLM would undertake plans for areas receiving new designations.

**Alternative C:** Alternative C would make 72 percent of the planning area available for oil and gas leasing. The Teshekpuk Lake Caribou Habitat LUEA and the Goose Molting Habitat LUEA, which contain important caribou and waterfowl habitat, would not be made available. The Kuukpik Corporation Entitlement LUEA would be available for oil and gas leasing, and all appropriate sale and leasing revenues due Arctic Slope Regional Corporation (ASRC) would be put in escrow. Aboveground pipelines could cross all lands, and all lands would be available for seismic studies. Protective measures would include applying stipulations described in the Draft and Final IAP/EISs, recommending a portion of the Colville be included as a scenic river in the WSR System, and proposing the same management designations for a Bird Conservation Area (BCA) and the Ikpikpuk Paleontological Sites and Pik Dunes LUEAs as noted for Alternative B. BLM would undertake plans for areas receiving new designations.

**Alternative D:** Alternative D would make 90 percent of the planning area available for oil and gas leasing. The Goose Molting Habitat LUEA would not be made available. The Kuukpik Corporation Entitlement LUEA would be available for oil and gas leasing, and all appropriate sale and leasing revenues due ASRC would be put in escrow. Aboveground pipelines could cross all lands within the planning area, and all lands would be available for seismic studies. Stipulations would protect caribou in the part of the Teshekpuk Lake Caribou Habitat LUEA available for oil and gas leasing. Other protective measures include applying other relevant stipulations described in the Draft and Final IAP/EISs, recommending a portion of the Colville be included as a recreational river in the WSR System, and proposing the same management designations for a BCA and the Ikpikpuk Paleontological Sites and Pik Dunes LUEAs as noted for Alternative B. BLM would undertake plans for areas receiving new designations. In addition, the agency would conduct an interagency wildlife management plan focusing on caribou and waterbird populations within the Teshekpuk Lake Caribou Habitat and the Goose Molting LUEAs.

**Alternative E:** Alternative E makes all BLM-administered lands in the planning area available to oil and gas leasing. The Kuukpik Corporation Entitlement LUEA would be available for oil and gas leasing, and all appropriate sale and leasing revenues due ASRC

would be put in escrow. Aboveground pipelines could cross all lands within the planning area, and all lands would be available for seismic studies. Stipulations would protect caribou in the Teshekpuk Lake Caribou Habitat LUEA and others would protect waterfowl in the Goose Molting Habitat LUEA. Other protective measures would include applying other relevant stipulations described in the Draft and Final IAP/EISs and proposing the same management designations for a BCA and the Ikpikpuk Paleontological Sites and Pik Dunes LUEAs as noted for Alternative B. BLM would undertake plans and studies similar to those anticipated for Alternative D.

# Management Considerations

This plan fulfills Congress's mandate in the Naval Petroleum Reserves Production Act (NPRPA) to conduct "an expeditious program of competitive leasing of oil and gas" and at the same time to protect the significant subsistence, environmental, fish and wildlife, and historic or scenic values "consistent with the requirements of this Act for the exploration of the reserve." This plan meets the total energy needs of the nation by making 87 percent of the planning area available for leasing, including lands nearest current oil development immediately to the east of the Reserve. Maximum protection of important surface resources is provided in Special Areas designated by the Secretary through a combination of prohibitions, restrictions, and stipulations restricting oil and gas facilities and other activities which might adversely impact wildlife habitat and subsistence use areas, as well as by positive management approaches.

Because of the years required to find, delineate, and develop a producing oil field in the remote arctic environment, oil leasing is not conducted to meet today's need but future projected needs. The U.S. currently imports about half its oil supply, and the Federal government projects that the proportion of the Nation's oil coming from overseas will continue to climb, approaching two-thirds by 2020. The Department of Energy also reports that domestic oil and gas production in the U.S. overall is declining, as it is on the North Slope of Alaska. Oil produced from the NPR-A would be transported using excess capacity of the existing Trans-Alaska Pipeline System, which would be available in the timeframe projected for development of new NPR-A fields. The Department of Energy also reports that importation of foreign oil significantly exacerbates this country's trade deficit. Domestic oil production, especially on Federal lands, contributes directly to the health of the Nation's economy and to Federal revenues. Most NPR-A oil is expected to be processed and consumed domestically. Even if a small portion of NPR-A oil may be exported, it can still help in the nation's trade imbalance and thereby indirectly help meet the nation's energy needs. Demand for petroleum is typically proportionately greater in relation to supply on the East Coast than on the West Coast. Because of transportation costs, the nation can obtain more oil with a given amount of money by purchasing foreign oil for the East Coast than shipping Alaskan oil there. Viewed in terms of a balance of trade, exporting an amount of Alaskan oil can produce export revenues which can be applied to purchase a greater amount of imported oil. In addition, the oil industry provides jobs, many of them high-skill and high-paying. Finally, lease sales, rentals, bonuses, and royalties from Federal oil and gas leases contribute to the Federal treasury, as do taxes paid by oil companies and their workers.

Federal law, including the NPRPA, the Federal Land Policy and Management Act (FLPMA), ANILCA, NEPA, and the Wild and Scenic Rivers Act, requires BLM to protect soil, water,

air, vegetation, wildlife, archaeological and paleontological resources, and subsistence uses. These resources are protected through prohibitions, restrictions, and stipulations on oil and gas and other activities which will effectively minimize environmental impacts, as well as through positive management approaches, such as Special Area designations, the development of the Colville River Management Plan, and other protective management measures.

The Alaska National Interest Lands Conservation Act (ANILCA) § 810 mandates special consideration for subsistence resources and uses. Subsistence concerns were also identified early in the planning process as a major management consideration. The plan includes special measures to protect subsistence use areas (e.g. Teshekpuk Lake, Fish and Judy Creeks and Miguakiak River and cabins and campsites) and wildlife habitats for waterfowl, caribou, and fish. In addition, to assure that subsistence resources and access to those resources are protected, the plan requires the integration of a consultation process into future oil and gas exploration and development. As part of this consultation process, BLM will institute a Subsistence Advisory Panel which will advise both industry and the agency on potential conflicts between proposed development actions and subsistence activities. Stipulations in the plan also provide for continued reasonable access by subsistence users through developed areas, avoiding as much as possible any restrictions on access to subsistence resources. The plan specifically prohibits an interconnecting road network linking the planning area to existing oil fields and roads to the east, thus alleviating concerns about possible increased competition for subsistence resources from persons residing outside the region.

Through the planning process, BLM has also identified significant wildlife concerns and has provided special protection for important habitats for waterfowl, caribou, raptors, and fish. Most of these specially protected areas fall within the existing secretarially-designated Special Areas. The decisions in this ROD provide maximum protection for the significant subsistence, recreational, fish and wildlife, historical, and scenic values of these Special Areas, consistent with the requirements of the NPRPA for exploration of the Reserve. In addition, the plan recommends that the Secretary add the Pik Dunes to the Teshekpuk Lake Special Area and the upper reaches of the Kikiakrorak and Kogosukruk Rivers (and certain tributaries of the latter) to the Colville River Special Area in recognition of the surface values of these areas.

The planning process identified caribou calving and insect-relief habitat, specifically that for the Teshekpuk Lake Caribou Herd, as meriting special management consideration. This herd is important for area residents' subsistence. For example, approximately a third of the subsistence diet of Nuiqsut residents comes from caribou. The plan prohibits permanent oil and gas facilities and seasonal exploratory and delineation wells in the great majority of the Teshekpuk Lake Caribou Herd's calving and insect relief habitat. Under the plan, permanent oil and gas surface facilities would not be allowed in the vast majority of the most valuable

caribou habitat, including movement corridors at pinch-points east and northwest of Teshekpuk Lake. In the part of the caribou calving habitat in which oil surface facilities will be allowed, special stipulations have been formulated to mitigate disturbance to the habitat or delay or deflection of caribou movements.

Fish is another important subsistence resource. Besides establishing stipulations which protect the water resource throughout the planning area (e.g., limits on water withdrawals from fish-bearing streams and lakes, refueling setbacks from stream and lake banks), the plan will forbid permanent oil and gas facilities in or within a 1/4 mile of certain deep water lakes used by fish. There are also similar, but in some cases larger, setbacks from several streams identified as important by North Slope subsistence users. These setbacks, such as from Fish and Judy Creeks and the Miguakiak River, help assure subsistence users' access to important subsistence areas and that fish and game in these areas are not disturbed.

The goose molting habitat north and east of Teshekpuk Lake merits special protection. It is the most important molting habitat in the Arctic, accounting for substantial numbers of Pacific flyway bird molting populations; up to 23 percent of brant molt in the area. During the flightless molting stage, the birds are extremely sensitive to disturbance. They must simultaneously grow new feathers and build up their reserves of energy to prepare for their long fall migration south. As a consequence, the plan prohibits oil and gas leasing in nearly all of the molting habitat in the planning area, and forbids permanent oil and gas facilities throughout the entire molting habitat.

The plan also offers special protection for raptor habitat. The bluffs of the Colville River and two of its tributaries, the Kikiakrorak and Kogosukruk Rivers, are important habitat for raptor species, including peregrine falcons which were on the threatened and endangered species list until 1994. Permanent oil and gas facilities will generally be prohibited under the plan from an area within a mile of these bluffs and the Colville River Management Plan will further address the need for protecting this important habitat.

In order to better manage the planning area, there is a need for additional information on animal populations and their habitats, the impacts of human activities on those populations and their habitats, and the effectiveness of various mitigating measures. The plan endorses additional research and monitoring and calls for the creation of an Research and Monitoring Team to coordinate this work.

The plan does not alter BLM's obligation to convey lands to the State of Alaska and to Native corporations and individuals, in accordance with the Alaska Statehood Act, the Alaska Native Claims Settlement Act (ANCSA), and the Native Allotment Act. The plan, however, does acknowledge the ANCSA selection rights of Kuukpik Corporation. To minimize the chance

that lands will be conveyed to the corporation encumbered with oil and gas leases, the plan calls for BLM to withhold from the first lease sale up to approximately 42,000 acres (twice Kuukpik's remaining entitlement) which are identified by the corporation.

# ANILCA Section 810 Summary

The Alaska National Interest Lands Conservation Act (ANILCA) § 810(a) requires that a subsistence evaluation be completed for this IAP/EIS. The ANILCA also requires that this evaluation include findings on three specific issues:

1. the effect of such use, occupancy, or disposition on subsistence uses and needs;
2. the availability of other lands for the purposes sought to be achieved; and
3. other alternatives that would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes (16 U.S.C. § 3120(a)).

The following discussion summarizes the ANILCA § 810 evaluation for the Preferred Alternative which was set out in greater detail in Appendix D of the Final IAP/EIS. The minor clarifications and modifications of the plan described in Appendix A of this ROD were also reviewed and found to have no effect which would change the subsistence evaluation and findings. Many of the changes only clarify language, while not changing the substance of the decision; change administrative arrangements with no substantial environmental impact; or allow changes in on-the-ground management under stringent conditions which would result in no substantial environmental impact.

a. *Without the Cumulative Case*: The effects of the plan adopted in this ROD fall below the "may significantly restrict" threshold, which is the test for a positive finding under ANILCA § 810. The impacts to subsistence resources and uses for this alternative are minimal. This finding applies to villages in and near the planning area and to subsistence users in other regions of Alaska, including southwestern Alaska.

b. *With the Cumulative Case:* The effects of the cumulative case presented in Section IV.H of the Final IAP/EIS exceeds the "may significantly restrict" threshold, and thus a positive ANILCA § 810 determination must be made. Although the effects of the activities proposed under the plan adopted in this ROD fall below the threshold, adding them to those of the cumulative case results in a level of effects that "may significantly restrict" subsistence uses.

The ANILCA § 810(a) provides that no "withdrawal, reservation, lease, permit, or other use, occupancy or disposition of the public lands which would significantly restrict subsistence uses shall be effected" until the Federal agency gives the required notice and holds a hearing in accordance with § 810(a)(1) and (2), and makes the three determinations required by § 810(a)(3)(A), (B), and (C). The BLM has found in this subsistence evaluation that all the

alternatives considered in this IAP/EIS (including the no-action alternative), when considered together with all the past, present, and reasonably foreseeable future cumulative effects discussed in the EIS, may significantly restrict subsistence uses. Therefore, BLM undertook the notice and hearing procedures required by ANILCA § 810(a)(1) and (2), as described above, and now must make the three determinations required by § 810(a)(3)(A), (B), and (C). 16 U.S.C. § 3120(a)(3)(A), (B), and (C).

We have determined that the plan meets the following requirements (16 U.S.C. § 3120(a)(3)(A), (B), and (C)) for Federal actions that may result in a significant restriction on subsistence uses:

1. *The significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands.*
   Only when considered together with cumulative effects of possible oil and gas activities on adjacent lands that are not under BLM's control, does the possibility exist that all the activities combined may significantly restrict subsistence uses. This possible restriction on subsistence uses could be lessened somewhat by not making any of the planning area available for oil and gas leasing, but this would not accomplish the management objectives for the planning area as guided by the statutory directives in the NPRPA, FLPMA, and other applicable laws, and for which the IAP was undertaken. The management principles under which the northeast NPR-A planning area is to be managed calls for an "expeditious program of competitive leasing of oil and gas" while providing for the protection of significant surface values, including environmental, fish and wildlife, historical, scenic and subsistence values. Moreover, even if BLM were to adopt the no-action alternative, the cumulative impacts on surrounding lands still would reach the may-significantly-restrict threshold under ANILCA § 810. The effects of the actions approved in this plan on subsistence resources and uses have been found to be very minimal. The BLM, therefore, has determined that the significant restriction that may occur under the plan when considered together with the cumulative case is necessary consistent with sound management principles for the utilization of these public lands.
2. *The proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition.*
   Given the legislative mandates cited above and the management objectives for which the IAP was undertaken, the process for determining which lands to offer for oil and gas leasing in the NPR-A did not focus solely on minimizing the total number of acres offered, although that was an important factor. Given economic limitations, that approach would have resulted in lease sales including more of the northernmost (highest prospect) part of the planning area, which might have

involved less total acres but which would have more intensively impacted the most critical habitat for subsistence resources. The plan instead combines prohibitions on leasing and oil and gas exploration and development on the most sensitive fish and wildlife lands with strict prohibitions on surface activities on other lands which are to be available for leasing. The restrictions on surface activities on both the leased and unleased lands protect fish and wildlife resources important to subsistence. It has been determined that the plan makes available the minimal amount of public lands necessary to carry out a successful leasing program at normal ($18 a barrel) price levels while still excluding or restricting oil and gas leasing and surface activities in the areas most important for subsistence resources and uses. Offering an even smaller, more southerly portion of the planning area for leasing would be significantly less likely to lead to the development of economically viable stand alone fields, given the economics of operations in this remote area, distances from existing infrastructure, future variations in oil prices that must be anticipated, and the restrictions imposed on surface activities and facilities which increase environmental and subsistence protections but also increase the costs to industry.

3. *Reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.*
   The plan, including its stipulations, provides many significant protections for subsistence uses and resources. These include restrictions on activities by oil and gas lessees, such as forbidding permanent oil and gas facilities in important subsistence use areas, including Teshekpuk Lake, the Miguakiak River, Fish and Judy Creeks, and near known long-term cabins and campsites. In addition, consultation with North Slope communities, the NSB, and the Subsistence Advisory Panel (an organization specifically established by the plan to advise BLM on matters of concern for subsistence users) must precede approval of oil and gas exploration and development permits. Stipulations also protect subsistence resources and their habitats through a multitude of restrictions on human activities in the planning area. Examples include stipulations regulating use and disposal of contaminants which could damage habitat, setbacks for certain activities from streams and lakes, and seasonal and spacial restrictions on activities near caribou calving areas. Roads linking the planning area to the infrastructure to the east have been prohibited, thus avoiding competition for subsistence reources from outsiders that improved access to the area might bring. The plan as a whole has been found to have only minimal impacts on subsistence resources and uses. Consequently, it has been determined that reasonable steps will be taken to minimize adverse impacts on subsistence uses and resources.

# Mitigation and Monitoring

Stipulations designed to protect the resources and uses of the planning area are listed in Appendix B. These stipulations include restrictions and guidelines on waste and spill prevention, handling, and disposal; overland moves and seismic surveys; oil and gas exploratory drilling, facility design, construction, and field abandonment; ground and air transportation; and other activities. They also contain additional special stipulations to protect subsistence resources and activities and traditional land use sites. Additional protective measures may be developed as part of NEPA evaluations of subsequent site-specific authorizations, including exploration and development plans, and of any second or subsequent oil and gas lease sales. It has been determined that all practical means to avoid or minimize environmental harm from the Preferred Alternative (as slightly modified by this ROD) have been adopted in this IAP/EIS.

Monitoring will be undertaken to determine the status of the various resources in the planning area, to ensure compliance with and enforcement of plan decisions and with stipulations attached to separate land use authorizations, and to measure the effectiveness of protective measures. The Research and Monitoring Team will help guide the monitoring effort in the planning area.

# Mitigation and Monitoring

# Public Involvement

The public and other government agencies have provided valuable comments throughout the planning process. The public outreach effort is described in Sections V and VI of the Final IAP/EIS. This effort included:

- A 30-day scoping period (later extended to more than 60 days) began February 13, 1997, with the issuance of the Notice of Intent to prepare the Northeast NPR-A IAP/EIS. More than 175 people attended five scoping meetings in Alaskan communities in March and April and BLM received 101 written scoping comments.
- The BLM and the Minerals Management Service, which helped BLM develop the IAP/EIS, held a public NPR-A science symposium in April 1997 to gather the most current scientific information and traditional knowledge relevant to the planning area's resources and uses.
- Federal, State, and NSB agency personnel met in April 1997 to develop preliminary alternatives.
- In May 1997 Federal, State, and NSB biologists met to help formulate protective measures for caribou and waterfowl in the Teshekpuk Lake area.
- Federal, State, NSB, and North Slope tribal government representatives met in Nuiqsut in August 1997 to draft measures to protect subsistence resources and their uses. Public meetings were held in Nuiqsut and Barrow in conjunction with this subsistence workshop effort.
- The U.S. Geological Survey's Biological Survey Division coordinated a peer review of the descriptions of the affected environment and the environmental consequences sections of the IAP/EIS. In addition, State, NSB, and Fish and Wildlife Service personnel joined BLM and MMS staff in a final review of the document prior to printing the Draft IAP/EIS.

  A 90-day review period was accorded the public on the Draft IAP/EIS. To facilitate communications from the public, comments were received by mail, e-mail, and via the BLM's NPR-A website. Also, public hearings were held in January 1998 on the IAP/EIS in Anaktuvuk Pass, Anchorage, Atqasuk, Barrow, Fairbanks, Nuiqsut, and Wainwright, Alaska, as well as Washington, D.C. and San Francisco. Upon the request of southwest Alaska residents, a subsistence hearing was held in Bethel and information meetings were held at Bethel and Hooper Bay. BLM received approximately 7,000 written comment messages and nearly 200 people testified at the public meetings on the Draft IAP/EIS. These comments were analyzed and the Final IAP/EIS reflected changes suggested by the commentors and responded to the comments offered on the draft.

- There was a 30-day comment period on the Final IAP/EIS. BLM received approximately 900 written comments by mail, e-mail, or over its internet website. The great majority of the respondents wrote to express opposition to oil and gas leasing in the planning area. They expressed essentially the same concerns as were enunciated during the comment period on the draft, and in addition commonly noted that the Preferred Alternative's proposal to lease up to 87 percent of the planning area did not strike a balance between development and surface resource protection. Other commentors offered specific suggestions for improvements and clarifications in the plan. We have considered these comments. Appendix A highlights the clarifications and slight modifications to the plan adopted as a result of these comments. Some responses raised concerns not aired during the comment period on the Draft IAP/EIS which have not resulted in changes. For example, some urged that we develop new regulations governing management of the Special Areas. We have not done so. The management plan itself sets management direction for the Special Areas so new regulations are not necessary. Some commentors stated that the pipeline will be worn out before NPR-A oil could pass through it, and asserted that our analysis should have included an assessment of impacts of the reconstruction of the pipeline. Pipeline maintenance and repair is on-going, but no special reconstruction is anticipated to bring NPR-A oil to market. Some commentors urged that exploratory drilling be allowed in the No Surface Activity area generally east, south, and west of Teshekpuk Lake. It has been determined, however, that the surface resources of the area merited the protection assured by this prohibition.

# Appendix A
# Modifications and Clarifications

The following list highlights clarifications and minor modifications in the Preferred Alternative as presented in the Final IAP/EIS adopted in this ROD.

1. Some commentors stated that non-governmental groups could contribute important expertise and perspective to a Research and Monitoring Team. We agree and have revised the ROD to broaden participation on it. The ROD drops "Interagency" from the Interagency Research and Monitoring Team's title proposed in the Final IAP/EIS, describes the Research and Monitoring Team as one composed of "representatives from Federal, State, and NSB agencies, the oil industry, environmental groups, academia, and other interested parties," and notes that this team will be chartered in accordance with the Federal Advisory Committee Act. This will allow the BLM to better benefit from the information and insights of a broad range of expertise. This change in the composition of the Research and Monitoring Team will have no substantial impacts relevant to the environment; through the integration of greater knowledge from the broader membership, impacts may, in fact, be further reduced.

2. Some commentors noted that the prohibition on exploratory drilling in lakes included in stipulation 28 may force drilling onto less environmentally desirable locations. There are some lakes in the planning area that do not support a fish community or abundant or diverse summer bird populations. These are commonly shallow lakes which freeze to the bottom by mid winter and many are isolated and not hydrologically connected to adjacent wetlands. Two new sentences are added to the end of this stipulation to make it clear that exceptions are allowed in certain limited circumstances set out in the sentences. Under the very limited circumstances in which this exception might be allowed, this is an insubstantial change relevant to environmental concerns because an exception may be authorized only where it would be environmentally preferable to maintaining the restriction and few resources are put at risk.

3. The North Slope Borough requested that decisions regarding the applicability of setbacks near known, long-term cabins and campsites as described in stipulations 23, 26, and 47 be a matter addressed in the consultation process described in stipulation 61. This would help assure that protection of these sites is provided in appropriate cases and that the AO will be better informed of cases in which the

setbacks might be waived without harm, such as when a cabin or campsite is not going to be in use during the period when winter seismic operations or exploratory drilling might occur. We have added language to each of these stipulations to bring them within the consultation process described in stipulation 61. We have also added a paragraph in stipulation 61 so that the consultation process for cabins and campsites is triggered by geophysical (i.e. seismic) permitting, as well as by exploration and development and production plans. This expansion of the consultation process would have no substantially changed effects relevant to the environment; indeed, by better informing the AO of the situation on the ground, it should improve management of these public lands.

4. Some commentors suggested that the consultation process for subsistence concerns near important wildlife, especially raptor, habitat near the Colville River and some of its tributaries should be expanded to also address wildlife concerns. This had been our intention, but the Final IAP/EIS did not reflect this. We have added a paragraph to the end of stipulation 62 to address this oversight. This expansion of the consultation process would have no substantial effects relevant to the environment; indeed, by better informing the AO of the situation on the ground, it should improve management of these public lands.

5. We received a suggestion that stipulation 27 be modified to specifically state that gravel pads will not be constructed for oil and gas exploration. This had been our intent; we assumed permanent facilities to include gravel pads. We believe that gravel pad construction for exploration is highly unlikely, as well as environmentally undesirable. The oil industry has indicated that it uses ice pads for such operations. To assure that no deviation from this practice occurs, we have specifically prohibited constructing gravel pads for exploratory drilling operations. This modification in the language of the stipulation will have no substantial effects relevant to environmental concerns since it simply clarifies a prohibition already assumed to be in place.

6. Language has been modified in the plan to clarify the deferral from leasing of lands the Kuukpik Corporation identifies. It was not our intention to require that Kuukpik commit to take its ANCSA selections from the lands it identifies prior to the first lease sale. The revised language describing the plan decision relevant to the Kuukpik Corporation Entitlement area clarifies this point, while retaining the limitation on the amount of land Kuukpik may ask to have deferred, i.e. twice its remaining entitlement. This clarification would have no substantial effects relevant to environmental concerns since the lands are still deferred from the first sale as indicated in the plan's prescribed management.

7. The Final IAP/EIS intentionally did not prohibit seismic operations and included stipulations 23 and 24 to provide guidelines on how seismic activities are to be conducted. Furthermore, in describing the Preferred Alternative, the Final IAP/EIS stated explicitly that seismic work would be permitted in the Teshekpuk Lake Special Protection Area and cites seismic operations as one of a number of authorized activities which shall comply with the stipulations. The Final IAP/EIS, however, inadvertently failed to state our intent that seismic operations be allowed throughout the planning area subject to stipulations. To assure that there is no confusion on this point, we have made a technical correction clarifying that seismic work will be allowed. This clarification will have no substantial effects relevant to the environment, since it does not reflect any change in the plan's prescribed management.

8. The Final IAP/EIS mistakenly indicated that four tributaries of the Kikiakrorak River, rather than the Kogosukruk River, were included in a 1-mile setback for oil and gas facilities described in stipulation 39 and the 2-mile consultation zones described in stipulation 62. Stipulations 39h, 39i, 62f, and 62g have been modified to correct this. This technical correction will have no impact relevant to the environment, since it does not reflect any change in the plan's prescribed management.

9. The Final IAP/EIS mistakenly used inconsistent language in describing prohibitions on permanent oil and gas facilities in the Teshekpuk Lake Surface Protection Area. Stipulation 31 has been reworded to accurately reflect the prohibitions stated in the description of the plan. This clarification will have no impacts relevant to the environment, since it does not reflect any change in the plan's prescribed management.

10. The final paragraph of stipulation 39 has been clarified to make it clearer that no exceptions will be granted to allow pipeline or road crossings in the Teshekpuk Lake setback area or road crossings in the the Colville River setback area. This clarification will have no substantial impacts relevant to environmental concerns because it makes no change in the plan's prescribed management.

11. The ROD adds language to stipulation 48 to clarify the intent that roads from the planning area to areas outside the area, including docks, are prohibited by the plan and no exceptions will be granted. It also has been reworded to reflect the Final IAP/EIS's intention that roads within an oil and gas field must be constructed to minimize environmental impacts and that roads between fields can only be approved after public comment and consultation with appropriate resource

agencies. These clarifications will have no substantial effect relevant to environmental concerns because they simply add consultation and make no changes in the plan's prescribed management.

# Appendix B
# Stipulations

The following definitions apply to the following stipulations:

**Active Floodplain:** The lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum that area subject to a 1 percent or greater chance of flooding in any given year (also referred to as the 100-year or base floodplain).

**Body of Water or Waterbody:** A lake, river, stream, creek, or pond that holds water throughout the summer and supports a minimum of aquatic life.

**Permanent oil and gas facilities:** Production facilities, pipelines, roads, airstrips, production pads, docks and other bottom-founded structures, seawater-treatment plants, and any other structure associated with an oil and gas operation that occupies land for more than one winter season. It does not include material sites or seasonal facilities such as ice roads and ice pads.

The following stipulations are based on existing policies and laws, and on knowledge of the resources present in the planning area and current industry practices. All stipulations will attach to all activities, including oil and gas leases issued in the planning area. All oil and gas activity permits issued subsequent to leasing shall comply with the appropriate lease stipulations specific to the activity under review. All permits issued in conjunction with other authorized activities (e.g., seismic operation, commercial guiding) within the planning area shall comply with the appropriate stipulations specific to the activity under review.

Additional site-specific stipulations may be added by the Authorized Officer (AO) as determined necessary by further NEPA analysis and as developed through consultation with other Federal, State, and NSB regulatory and resource agencies. Other Federal, State, and NSB permits (e.g., NPDES, Clean Water Act [CWA] Section 404) also may be required by law or regulation for an oil and gas project to proceed. A list of permits/approvals commonly required in conjunction with an oil and gas exploration and development project is provided in Table II.F.1 of the Final IAP/EIS. (All references to tables and figures in these stipulations are to the tables and figures in the Final IAP/EIS. Also see the Final IAP/EIS for maps of Land Use Emphasis Areas (LUEAs) referred to in these stipulations.) Additional permits not listed in Table II.F.1 may be required. Specific State permits are required when the State has primary authority, under Federal or State law or regulation, for enforcement of the provision in question. Specific permits issued by Federal agencies other than BLM could include permit conditions that are more stringent than those presented below.

**Exception Clause:** In the event that an exception to a lease or permit stipulation is requested and before an exception may be granted, the AO shall find that implementation of the stipulation is:

1. a) technically not feasible or
   b) economically prohibitive or
   c) an environmentally preferable alternative is available, and
2. the alternative means proposed by the lessee fully satisfies the objective(s)of the stipulation.

In addition, prior to the consideration or granting of an exception to a lease or permit stipulation, all conditions and/or consultation requirements specific to a stipulation must be met. The AO shall consult with appropriate Federal, State, and NSB regulatory and resource agencies before an exception may be granted, except in the case of an emergency. The AO's power to grant stipulation exceptions is limited to those subjects, uses, and permits over which the BLM has authority. Exceptions may be granted in emergencies involving human health and safety.

**Waste Prevention, Handling, and Disposal and Spills:**

1. To prevent and minimize present and future pollution, management decisions affecting waste generation shall be addressed in the following order of priority:

   -Prevention and Reduction
   -Recycling
   -Treatment
   -Disposal

   a. Lessees shall prepare a waste-management plan approved by the AO, in consultation with appropriate Federal, State, and NSB regulatory and resource agencies, to achieve specific waste-reduction and prevention goals for all phases of exploration and development (including activities conducted by contractors). The plan shall identify all waste streams that will be produced during each operation by type, volume, and toxicity and the method of disposal. For each waste stream, the lessee/operator shall describe what actions will be taken to minimize the volume. The plan should include activities that will integrate pollution prevention concepts into purchasing, inventory, shipping/receiving, operations maintenance, training, accounting, and design. The goal of the plan shall be continuous environmental improvement and achievement of reduction goals developed through the planning process. Lessees shall develop schedules for implementation and review to meet reduction and prevention goals, designate accountable personnel to carry out action items, and specify budget line items for plan elements. Lessees shall provide the AO with an annual waste-management report.

   b. Lessees shall implement a hazardous-materials tracking system to ensure proper use, storage, and management of materials being used within industrial processes. The use of chlorinated solvents is prohibited.

   c. Lessees shall conduct annual environmental compliance audits.

2. Attracting wildlife to food and garbage is prohibited. All feasible precautions shall be taken to avoid attracting wildlife to food and garbage. A current list of approved precautions, specific to type of permitted use, can be obtained from the AO. Lessees and permitted users shall have a written procedure to ensure that the handling and disposal of putrescible waste will be accomplished in a manner to prevent the attraction of wildlife.

3. Burial of garbage is prohibited. All putrescible waste shall be incinerated or composted through an AO-approved system, unless otherwise authorized by the AO. All solid waste, including incinerator ash, shall be removed from BLM lands and disposed of in an approved waste-disposal facility in accordance with U.S. Environmental Protection Agency (USEPA) and State of Alaska, Dept. of Environmental Conservation (ADEC) regulations and procedures. Burial of human waste is prohibited except as authorized by the AO.

4. Except as specifically provided, all pumpable solid, liquid, and sludge waste shall be disposed of by injection in accordance with USEPA, ADEC, and the Alaska Oil and Gas Conservation Commission regulations and procedures. On-pad temporary muds and cuttings storage will be allowed as necessary to facilitate annular injection and/or backhaul operations.

5. Wastewater disposal:
   a. Unless authorized by the National Pollution Discharge Elimination System (NPDES) or State permit, disposal of domestic wastewater into bodies of freshwater, including wetlands, is prohibited.
   b. Surface discharge of reserve-pit fluids is prohibited unless authorized by applicable NPDES, ADEC, and NSB permits and approved by the AO.
   c. Disposal of produced waters in upland areas, including wetlands, will be by subsurface-disposal techniques. The AO, in consultation with the ADEC and USEPA, may permit alternate disposal methods, if the lessee demonstrates that subsurface disposal is not feasible or prudent.
   d. Discharge of produced waters into open or ice-covered marine waters less than 33 feet (10 meters) in depth is prohibited. The AO in consultation with ADEC and USEPA may approve discharges into waters greater than 33 feet (10 meters) in depth based on a case-by-case review of environmental factors and consistency with the conditions of a NPDES permit.
   e. Alternate disposal methods will require an NPDES permit certified by the State.

6. Areas of operation shall be left clean of all debris.

7. All spills shall be cleaned up immediately and to the satisfaction of the AO and all agencies with regulatory authority over spills, including the USEPA, ADEC, and the U.S. Coast Guard.

8. Notice of any spill shall be given to the AO as soon as possible. Other Federal, State, and NSB entities shall be notified as required by law.

9. For oil- and gas-related activities, a Hazardous-Materials Emergency-Contingency Plan shall be prepared and implemented prior to transportation, storage, or use of fuel. The plan shall include a set of procedures to ensure prompt response, notification, and cleanup in the event of a hazardous substance spill or threat of a release. Procedures applicable to fuel handling (associated with transportation vehicles) may consist of Best Management Practices approved by the AO. The plan shall include a list of resources available for response (e.g., heavy-equipment operators, spill-cleanup materials or companies), and names and phone numbers of Federal, State, and NSB contacts. Other Federal and State regulations may apply and require additional planning requirements. All staff shall be instructed regarding these procedures.

10. Oil-spill-cleanup materials (absorbents, containment devices, etc.) shall be stored at all fueling points and vehicle-maintenance areas and be carried by field crews on all overland moves, seismic work trains, and similar overland moves by heavy equipment.

11. Lessees shall provide refresher spill-response training to NSB and local community spill-response teams on a yearly basis.

12. Lessees shall plan and conduct a major spill-response field-deployment drill annually.

13. Prior to production and as required by law, lessees shall develop spill prevention and response contingency plans and participate in development and maintenance of the *North Slope Subarea Contingency Plan for Oil and Hazardous Substances Discharges/Releases* for the NPR-A operating area. Planning shall include development and funding of detailed (e.g., 1:26,000 scale) environmental sensitivity index maps for the lessee's operating area and areas outside the lessee's operating area that could be affected by their activities. (The specific area to be mapped shall be defined in the lease agreement and approved by the AO in consultation with appropriate resource agencies). Maps shall be completed in paper copy and geographic information system format in conformance with the latest version of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration's *Environmental Sensitivity Index Guidelines*. Draft and final products shall be peer reviewed and approved by the AO in consultation with appropriate Federal, State, and NSB resource and regulatory agencies.

14. Except during overland moves and seismic operations (see stipulation 24m), fuel, other petroleum products, and other liquid chemicals designated by the AO, whether in excess of 660 gallons in a single tank or in excess of 1,320 gallons in multiple containers, shall be stored within an impermeable lined and diked area capable of containing 110 percent of the stored volume. The liner material shall be compatible with the stored product and capable of remaining impermeable during typical weather extremes expected throughout the storage period. Permanent fueling stations shall be lined or have impermeable protection to prevent fuel migration to the environment due to overfills and spills. The storage area shall be located at least 500 feet from any waterbody with the exception of small caches (up to 210 gallons) for motor boats, float planes, and ski planes.

15. Fuels shall not be stored on the active floodplain of any waterbody. Although fuels may be off-loaded from aircraft on ice, fuels shall not be stored on lake or river ice.

16. Refueling of equipment within 500 feet of the highest high water mark of any waterbody is prohibited with the exception of refueling motor boats, float planes, and ski planes. (See stipulation 24n for restrictions related to overland moves and seismic operations.)

17. All fuel containers, including barrels and propane tanks, shall be marked with the responsible party's name, product type, and year filled or purchased.

**Ice Roads and Water Use:**

18. The location of winter ice roads shall be offset from year to year to minimize vegetative impacts. The offset shall be greater than or equal to the width of the road.

19. Compaction of snow cover or snow removal from fish-bearing waterbodies shall be prohibited except at approved ice-road crossings.

20. Water withdrawal from rivers and streams during winter is prohibited. Water withdrawal is prohibited during winter from lakes less than 7 feet ( 2.1 m) deep if they are interconnected with or subject to seasonal flooding by a fish-bearing stream. Water may be withdrawn from isolated lakes that are less than 7 feet (2.1 m) deep that lack connection to or are not subject to seasonal flooding by a fish-bearing stream. After consultation with the appropriate Federal, State, and NSB regulatory and resource agencies, the AO may authorize withdrawals from any lake less than 7 feet (2.1 m) deep, if the proponent demonstrates that no fish exist in the lake.

Generally, water withdrawal drawdown during winter from lakes 7 feet (2.1 m) deep or deeper shall be limited to 15 percent of the estimated free-water volume (i.e., excluding the ice). After consultation with the appropriate Federal, State, and NSB regulatory and resource agencies, the AO may authorize drawdown exceeding 15 percent from a lake greater than 7 feet (2.1 m) deep, if the proponent of the additional drawdown demonstrates that no fish exist in the lake. Operators are encouraged to use new ice-road and ice-pad construction methods, such as using aggregate "chips" shaved from frozen lakes, to decrease water demands, construction time, and impact on fisheries.

21. The AO, in consultation with appropriate Federal, State, and NSB regulatory and resource agencies, may allow water extraction from any lake used by molting geese, if it is determined that the withdrawal is consistent with stipulation 20 and will not adversely affect identified goose-feeding habitat along lakeshore margins. An analysis/demonstration of the hydrologic functions of the lake(s) under review may be required of the lessee by the AO prior to approval of the withdrawal.

22. Except for approved crossings, alteration of the banks of a waterway is prohibited. Waterways include natural features with sufficient water to create riparian (willow) habitat such as rivers, streams, deep and shallow lakes, tundra ponds, and shallow water tracks. Clearing of willows along the riparian zone is prohibited. Movement of equipment through willow stands shall be avoided whenever possible.

**Overland Moves and Seismic Work:**

23. Seismic work is prohibited within 1,200 feet of any known, long-term cabin or campsite, identified by the AO, without the written permission of the AO. The AO's decision will be informed by the consultation process described in stipulation 61.

24. The following restrictions apply to overland moves, seismic work, and any similar use of heavy equipment (other than actual excavations as part of construction) on unroaded surfaces during the winter season:

    a. Because polar bears are known to den predominantly within 25 miles of the coast, operators shall consult with the Fish and Wildlife Service (FWS) prior to initiating activities in such habitat between October 30 and April 15. Activities are prohibited within 1 mile of known or observed polar bear dens; obtain locations from the FWS, (907) 786-3800. Operators are encouraged to apply for a letter of authorization from the FWS to conduct activities in polar bear denning areas.
    b. Motorized ground-vehicle use will be minimized within the Colville River Raptor, Passerine, and Moose Area LUEA from April 15 through August 5, with the exception that use will be minimized in the vicinity of gyrfalcon nests beginning March 15. Such use will remain ½ mile away from known raptor-nesting sites, unless authorized by the AO. The BLM shall consult with FWS to plan travel routes to minimize disturbance to raptors.
    c. Crossing of waterway courses shall be made using a low-angle approach to avoid disruption of the natural stream or lake bank. Except at approved crossings, operators are encouraged to travel a minimum of 100 feet from overwintering fish streams and lakes.
    d. If snow ramps or snow bridges are used at water crossings for bank protection, the ramps and bridges shall be substantially free of soil and/or debris. Snow bridges shall be removed or breached immediately after use or before spring breakup.
    e. To avoid additional freeze down of deep-water pools harboring overwintering fish, waterways shall be crossed at shallow riffles from point bar to point bar whenever possible.

f. On-the-ground activities shall use low-ground-pressure vehicles such as Rolligons, ARDCO, Trackmaster, Nodwell, or similar types of vehicles. A current list of approved vehicles can be obtained from the AO. Limited use of tractors equipped with wide tracks or "shoes" will be allowed to pull trailers.
g. Bulldozing of tundra, trails, or seismic lines is prohibited. This stipulation, however, does not prohibit the clearing of drifted snow along a trail, seismic line, or in a camp, to the extent that the tundra mat is not disturbed. Snow may be cleared from a waterbody ice surface to prepare an aircraft runway, if approved by the AO in consultation with appropriate Federal, State, and NSB regulatory and resource agencies.
h. To reduce the possibility of ruts, vehicles shall avoid using the same trails for multiple trips unless necessitated by serious safety or superseding environmental concern. This provision does not apply to ice roads (see stipulation 18 above).
i. Ground operations are to begin only after the seasonal frost in the tundra and underlying mineral soils has reached a depth of 12 inches, and the average snow cover is 6 inches deep. The exact date shall be determined by the AO.
j. Ground operations shall cease when the spring melt of snow begins; approximately May 5 in the foothills area where elevations exceed 300 feet, and approximately May 15 in the northern coastal areas. The exact date will be determined by the AO.
k. Seismic activities and overland moves within the Goose Molting LUEA and the Teshekpuk Lake Caribou Habitat LUEA from May 1 through September 30 are prohibited. (Note that this overrides language in stipulation 24j.)
l. To prevent surface disturbance to tundra and other vegetation, tracked vehicles will not execute tight turns by locking one track.
m. Operators shall use best available technology (e.g., self-contained containment systems) or other appropriate spill containment measures, approved by the AO, to prevent fuel migration from fuel or chemical storage areas to the environment due to overfills and spills.
n. Refueling of equipment is prohibited within the active floodplain of any waterbody.

**Oil and Gas Exploratory Drilling:**

25. From May 1 through September 30, exploratory drilling other than from production pads is prohibited in the Special Caribou Stipulations Area (Fig. II.C.1-1).

26. Exploratory drilling is prohibited within 1,200 feet of any known, long-term cabin or campsite, identified by the AO, without written permission of the AO. The AO's decision will be informed by the consultation process described in stipulation 61.

27. Permanent or gravel oil and gas facilities including roads shall not be constructed during the exploration phase of oil and gas development.

28. Exploratory drilling in river, stream, and lake beds, as determined by the highest high water mark, is prohibited. Exceptions to this stipulation may be authorized by the AO in cases of shallow lakes which freeze to the bottom, do not support significant fish or bird populations, and are hydrologically isolated. Further, such an exception may be granted only if it is environmentally preferable to maintaining the restriction.

**Facility Design and Construction:**

29. At least 3 years prior to approval of any development plan for leases within the Special Caribou Stipulations Area (see Fig. II.C.1-1), the lessee shall design and implement a study of caribou movement, including historical information regarding the distribution and range use of the Teshekpuk Lake Caribou Herd, as well as maps of caribou trails within the area. Study data may be gathered concurrent with approved seismic and exploration activity. The study design shall be approved by the AO in consultation with the Research and Monitoring Team. The study will include a minimum of 3 years of data to assist in providing the information necessary to determine facility design and location, including pipelines, that will be part of the development plan. Lessees may submit individual plans or they may combine with other lessees in the area to do a joint study. Total study funding by all lessees will not exceed $500,000.

30. Causeways and docks are prohibited in river mouths or deltas. Artificial gravel islands and bottom-founded structures are prohibited in river mouths or active stream channels on river deltas, except as provided in the paragraphs below.

    The BLM discourages the use of continuous-fill causeways. Environmentally preferred alternatives for field development include the use of onshore directional drilling, elevated structures, or buried pipelines. Approved causeways shall be designed, sited, and constructed to prevent significant changes to near shore oceanographic circulation patterns and water-quality characteristics (e.g., salinity, temperature, suspended sediments) that result in exceedences of water-quality criteria, and must maintain free passage of marine and anadromous fish.

    Causeways, docks, artificial gravel islands, and bottom-founded structures may be permitted if the AO, in consultation with appropriate Federal, State, and NSB regulatory and resource agencies, determines that a causeway or other structure is necessary for field development, and that no feasible and prudent alternative exists. A monitoring program may be required to address the objectives of water quality and free passage of fish. Additional mitigation shall be required where significant deviation from these objectives occurs.

31. Permanent oil and gas surface occupancy, including but not limited to permanent oil and gas facilities, pads, rigs, platforms, gravel roads, airstrips, pipelines, gravel or other material extraction sites, and exploration and delineation drilling facilities are prohibited in the Teshekpuk Lake Surface Protection Area (specifically, T. 13 N., Rs. 3-7 W., U.M.; Secs. 1-6, 8-16, 21-25, 36, T. 13 N., R. 8 W., U.M.; T. 14 N., Rs. 1-2 E. and Rs. 1-8 W., U.M.; Secs. 1-2, 11-14, T. 14 N., R. 9 W., U.M.; T. 15 N., Rs. 2-8 W., U.M.; Secs. 1-3, 7-30, 35-36, T. 15 N., R. 9 W., U.M.; T. 16 N., Rs. 2-8 W., U.M.; Secs. 1-6, 8-17, 21-27, 34-36, T. 16 N., R. 9 W., U.M.; T. 17 N., Rs. 1-9 W., U.M.; and T. 18 N., Rs. 2-8 W., U.M.). No exceptions will be granted to this stipulation.

32. Lessees shall use maximum economically feasible extended-reach drilling for production drilling to minimize the number of pads and the network of roads between pads. New developments shall share facilities with existing development when prudent and technically feasible. All oil and gas facilities, except airstrips, docks, and seawater-treatment plants, will be collocated with drill pads. If possible, airstrips will be integrated with roads. Given the paucity of gravel sites in the planning area and the cost of transporting gravel from outside the planning area, lessees are encouraged to implement gravel-reduction technologies e.g., insulated or pile-supported pads.

33. Within the Special Caribou Stipulations Area (see Fig. II.C.1-1), lessees shall orient linear corridors when laying out oil field developments to address migration and corralling effects and to avoid loops of road and/or pipeline that connect facilities.

34. Lessees shall separate elevated pipelines from roads by a minimum of 500 feet, if feasible. Separating roads from pipelines may not be feasible within narrow land corridors between lakes and where pipe and road converge on a drill pad.

35. To minimize delay or deflection of caribou movements, lessees shall place pipeline on the appropriate side of the road as determined by the AO (depending on general caribou movements in the area).

36. In the Special Caribou Stipulations Area (see Fig. II.C.1-1) and where facilities or terrain may funnel caribou movement, ramps over pipelines, buried pipe, or pipe buried under the road may be required by the AO after consultation with appropriate Federal, State, and NSB regulatory and resource agencies.

37. Aboveground pipelines shall be elevated at least 5 feet, as measured from the ground to the bottom of the pipe, except where the pipeline intersects a road, pad, or a ramp installed to facilitate wildlife passage and subsistence passage and access. The AO, in consultation with appropriate Federal, State, and NSB regulatory and resource agencies, may make an exception if no feasible and prudent means exists to meet the requirement.

38. All crude oil, produced water, seawater, and natural gas pipelines shall be constructed to accommodate the best available technology for detecting corrosion or mechanical defects during routine structural integrity inspections.

39. Permanent oil and gas facilities, including roads, airstrips, and pipelines, are prohibited within and adjacent to the waterbodies listed below at the distances identified to protect fish and raptor habitat, cultural and paleontological resources, and subsistence and other resource values. Setbacks include the bed of the waterbody and are measured from the bank's highest high water mark.

    a. **Ikpikpuk River:** a ½-mile setback from the bank of the Ikpikpuk River within the planning area (fish, raptors, subsistence, cultural, and paleontological resources).
    b. **Miguakiak River:** a ½-mile setback from each bank of the Miguakiak River (fish and subsistence resources).
    c. **Teshekpuk Lake:** a ½-mile setback from the bank and around the perimeter of Teshekpuk Lake (fish and subsistence resources).
    d. **Fish Creek:** (1) a 3-mile setback from each bank of Fish Creek downstream from Section 31, T11N, R1E; (2) a ½-mile setback from each bank of Fish Creek in and upstream from Section 31, T11N, R1E (fish and subsistence resources).
    e. **Judy Creek:** a ½-mile setback from each bank of Judy Creek extending from the mouth to the confluence of an unnamed tributary in Sec. 8, T8N., R.2W., Umiat Meridian (fish and subsistence resources).
    f. **Colville River:** a 1-mile setback from the western bluff (or bank if there is no bluff) of the Colville River extending the length of the river as described in the Colville River Raptor, Passerine, and Moose LUEA. This restriction does not apply within 1½ mile of the Umiat airstrip (fish, raptor, passerine, moose, paleontological, subsistence, scenic, and recreational resources).

g. **Deep Water Lakes:** a ¼-mile setback around the perimeter of any fish-bearing lake within or partially within the deep lake zone (see Fig. II.B.5) (fish resources). (If the fish-bearing status of the waterbody is unknown, the burden is on the lessee to demonstrate whether fish are present.)
h. **Kikiakrorak River:** a 1-mile setback from each bluff (or bank if there is no bluff) of the Kikiakrorak River downstream from T.2 N, R. 4 W., Umiat Meridian (raptor, passerine, and moose resources).
i. **Kogosukruk River:** a 1-mile setback from each bluff (or bank if there is no bluff) of the Kogosukruk River (including the four tributaries off the southern bank) downstream from T.2 N., R.3W., Umiat Meridian (raptor, passerine, and moose resources).

On a case-by-case basis, essential pipeline and road crossings will be permitted, in consultation with appropriate Federal, State, and NSB regulatory and resource agencies, through setback areas in those instances where no other suitable sites are available. Stream crossings will be sited perpendicular to the main channel flow; lake crossings will be at the narrowest point. Pipeline and road crossings are prohibited in the setback around Teshekpuk Lake, with no exceptions. Road crossings are prohibited in the setback adjacent to the Colville River with no exceptions.

40. Gravel mining sites required for development activities will be restricted to the minimum necessary to develop the field efficiently and with minimal environmental damage. Where feasible and prudent, gravel sites shall be designed and constructed to function as water reservoirs for future use. Gravel mine sites are prohibited within the active floodplain of a river, stream, or lake unless the AO, in consultation with appropriate Federal, State, and NSB regulatory and resource agencies, determines that there is no feasible and prudent alternative or that a floodplain site would enhance fish and wildlife habitat after mining operations are completed and the site is closed.

    Mine site development and rehabilitation within a floodplain shall follow the procedures outlined in McLean (1993), North Slope Gravel Pit Performance Guidelines; State of Alaska, Dept. of Fish and Game (ADF&G) Habitat and Restoration Division Technical Report 93-9.

41. For those waterbodies not listed in stipulation 39, permanent oil and gas facilities, including roads, airstrips, and pipelines, are prohibited upon or within 500 feet as measured from the highest high water mark of the active floodplain. Essential pipeline and road crossings will be permitted on a case-by-case basis.

42. Bridges, rather than culverts, shall be used for any allowed road crossings on all major rivers, including those waterbodies listed in stipulation 39 or identified by the AO in consultation with appropriate Federal, State, and NSB regulatory and resource agencies, to reduce the potential of ice-jam flooding and erosion. When necessary on smaller streams, culverts shall be large enough to avoid restriction of fish passage or adversely affecting natural stream flow.

43. The natural drainage pattern will be identified prior to and maintained during and after construction. All permanent structures constructed adjacent to a body of water, such as approved road and pipeline crossings, shall be sited and designed to limit erosion from flooding and wave action (e.g., through use of slope-protection measures). Cross-drainage structures will be sited, maintained, and properly abandoned to prevent impoundments or alteration of local or areawide hydrology. Gravel structures shall be designed and sited to minimize the length that is perpendicular to sheet flow.

44. Dewatering during construction shall be conducted using Best Management Practices (BMP's). A current list of BMP's will be available from the AO. Examples include the use of splash plates, dewatering points, natural filtration through vegetation, and dewatering during low-water period.

45. No surface structures, except essential transportation crossings, are allowed within the Pik Dunes LUEA.

46. Lessees shall minimize the impact of industrial development on key wetlands. Key wetlands are those wetlands that are important to fish, waterfowl, and shorebirds because of their high value or scarcity in the region. Lessees shall identify on a map or aerial photograph the largest surface area, including future expansion areas, within which a facility is to be sited or an activity is to occur. The AO will consult with Federal, State, and NSB regulatory and resource agencies to identify key wetlands and work with lessees during the development of operating plans. To minimize impact, the lessee shall avoid siting facilities in the identified wetlands, unless no feasible and prudent alternative exists. Key wetland types include but are not limited to fish-bearing lakes and streams, riparian shrub, and the following classes described by Bergman et al. (1977): shallow and deep-*Arctophila* ponds, deep-open lakes, basin-complex wetlands, and coastal wetlands.

47. Permanent oil and gas facilities are prohibited within 1 mile of known long-term cabins or long-term campsites, identified by the AO, except that pipelines and roads are allowed up to ¼ mile from such cabins or campsites. The AO's decision will be informed by the consultation process described in stipulation 61.

48. Permanent roads (i.e. gravel, sand) connecting to a road system or docks outside the planning area are prohibited, and no exceptions may be granted. Permanent roads necessary to connect pads within independent, remote oil fields are allowed but they must be designed and constructed to create minimal environmental impacts. Roads connecting production sites between separate oil fields may be considered if road-connected operations are environmentally preferable to independent, consolidated operations that each include airstrip, housing, production, and support facilities. This exception will only be granted following consultations with appropriate Federal, State, and NSB regulatory and resources agencies, and the appropriate level of NEPA review.

**Ground Transportation:**

49. The following ground-traffic restrictions apply to permanent roads (as authorized in stipulation 48 above) in the Special Caribou Stipulations Area (Fig. II.C.1-1):

    a. From May 20 through June 20:
        (1) Traffic speed will not exceed 15 miles per hour.
        (2) Traffic will be minimized (a reasonable target would be four convoy round-trips per day between facilities). Nonessential operations requiring vehicles shall be suspended during this time period.

    b. From May 20 through August 1:
        (1) Caribou movement will be monitored.
        (2) Based on this monitoring, traffic will cease when a crossing by 10 or more caribou appears to be imminent.

c. From May 20 through August 20:
   (1) Convoying will be used to minimize the number of disturbances due to road traffic.
   (2) Personnel will be bussed between work sites and other facilities to minimize the number of vehicles on the road.

50. Major stockpiling of equipment, materials, and supplies for oil and gas activities in the Special Caribou Stipulations Area (see Fig. II.C.1-1) shall occur prior to or after the period May 20 through June 20 to minimize road traffic during that period.

51. Chasing wildlife with ground vehicles is prohibited.

**Air Traffic:**

(Note: The BLM's authority to restrict air traffic is limited to those activities associated with use authorization on BLM-administered lands.)

52. Use of aircraft larger than a Twin Otter for authorized activities in the planning area, including oil and gas activities, from May 20 through August 20 within the Teshekpuk Lake Caribou LUEA (see Fig. II.B.4) is prohibited, except in cases of emergency.

53. Helicopter overflights for BLM-permitted activities shall be suspended in the Goose Molting LUEA (see Fig. II.B.2) from June 15 through August 20.

54. Fixed-wing aircraft traffic takeoffs and landing for BLM-permitted activities in the planning area shall be limited to an average of one round-trip flight a day from May 20 through June 20 at aircraft facilities in the Teshekpuk Lake Caribou Habitat LUEA (see Fig. II.B.4). Within the Goose Molting LUEA (see Fig. II.B.2), fixed-wing aircraft use for such activities shall be restricted from June 15 to August 20 to flight corridors and frequencies established by BLM in consultation with the appropriate Federal, State, and NSB regulatory and resource agencies.

55. Aircraft shall maintain an altitude of at least 1,000 feet above ground level (AGL) (except for takeoffs and landings) over caribou winter ranges from October 1 through May 15 and 2,000 feet AGL over the Teshekpuk Lake Caribou Habitat LUEA (see Fig. II.B.4) from May 16 through July 31, unless doing so would endanger human life or violate safe flying practices.

56. Aircraft shall maintain an altitude of at least 1,500 feet AGL when within ½ mile of cliffs identified as raptor nesting sites from April 15 through August 5, unless doing so would endanger human life or violate safe flying practices. Aircraft shall maintain an altitude of 1,500 feet AGL when within ½ mile of known gyrfalcon nest sites from March 15 to April 15. Permittees shall obtain information from BLM necessary to plan flight routes near gyrfalcon nests.

57. Hazing of wildlife by aircraft is prohibited.

**Oil Field Abandonment:**

58. Upon field abandonment or expiration of a lease or oil- and gas-related permit, all facilities shall be removed and sites rehabilitated to the satisfaction of the AO, in consultation with appropriate Federal, State, and NSB regulatory and resource agencies. The AO may determine that it is in the best interest of the public to retain some or all of the facilities. Lessees shall comply with all exploration and development bonding required by law and regulation (43 CFR 3154.1 and 3134.1). No exceptions shall be granted to this provision.

**Subsistence:**

59. During exploration, development, and production, the lessee shall develop and implement a plan, approved by the AO in consultation with the Research and Monitoring Team and the Subsistence Advisory Panel, to monitor the effects of activities on subsistence. The lessee shall provide biannual reports to BLM, the Research and Monitoring Team, and the Subsistence Advisory Panel.

60. Lessees shall not unreasonably restrict access by subsistence users in oil field development areas.

    a. Lessees shall establish procedures for entrance to facilities, the use of roads, and firearms discharge. These procedures shall be developed in consultation with affected local communities, NSB, and the Subsistence Advisory Panel and be approved by the AO. In cases where the lessee and the Panel disagree, the AO will determine the appropriate procedure.
    b. Lessees shall develop and distribute information about how to conduct subsistence activities in development areas safely (so equipment is not damaged and people are not endangered) to the communities through public meetings, newsletters, radio, and signs in both English and Inupiaq.

61. Exploration and development and production operations shall be conducted in a manner that prevents unreasonable conflicts between the oil and gas industry and subsistence activities.

    Prior to submitting an exploration plan or development and production plan (including associated oil-spill contingency plans) to the BLM, the lessee shall consult with potentially affected subsistence communities (e.g., Barrow, Nuiqsut, Atqasuk, or Anaktuvuk Pass), NSB, and the Subsistence Advisory Panel to discuss potential conflicts with the siting, timing, and methods of proposed operations and safeguards or mitigating measures that could be implemented by the operator to prevent unreasonable conflicts. Through this consultation, the lessee shall make every reasonable effort, including such mechanisms as a conflict avoidance agreement, to ensure that exploration, development, and production activities are compatible with subsistence hunting, fishing, and other subsistence activities and will not result in unreasonable interference with subsistence harvests.

    A discussion of resolutions reached during this consultation process, specific conflict avoidance agreement(s), and plans for continued consultation shall be included in the permit application, exploration plan, or the development and production plan. In particular, the lessee shall show in the plan how its activities, in combination with other activities in the area, will be scheduled and located to prevent unreasonable conflicts with subsistence activities. Lessees also shall include a discussion of multiple or simultaneous operations, such as exploration and delineation well drilling and seismic activities, that can be expected to occur during operations to more accurately assess the potential for any cumulative effects. Communities, individuals, and other entities who were involved in the consultation shall be identified in the application or plan. The AO shall send a copy of the exploration plan or development and production plan

(including associated oil-spill-contingency plans) to the potentially affected communities, the NSB, and the Subsistence Advisory Panel at the time they are submitted to the BLM to allow concurrent review and comment as part of the plan approval process.

In the event no agreement is reached between the parties, the AO shall consult with representatives from the subsistence communities, Subsistence Advisory Panel, NSB, and the lessee(s) to specifically address the conflict and attempt to resolve the issues before making a final determination on the adequacy of the measures taken to prevent unreasonable conflicts with subsistence harvests.

The lessee shall notify the AO of all concerns expressed by subsistence users during operations and of steps taken to address such concerns. Lease-related use will be restricted, when the AO determines it is necessary to prevent unreasonable conflicts with local subsistence hunting, fishing, and other subsistence activities.

In enforcing this stipulation, the AO will work with other agencies and the public to assure that potential conflicts are identified and efforts are taken to avoid these conflicts, e.g., planning seismic operations to avoid traditional land use sites and allotments. These efforts may include seasonal drilling restrictions, seismic restrictions, and directional drilling requirements or use of other technologies deemed appropriate by the AO.

The consultation process described in this stipulation will also be required of applicants for geophysical (i.e. seismic) permits to address potential conflicts with the setback requirements for cabins and campsites described in stipulation 23. This consultation will help provide information to the AO on the advisability of modifying or waiving the restriction on seismic activity identified in stipulation 23.

62. The following subsistence, wildlife habitat, and traditional/cultural land use areas are of significant concern to local communities and will be given special consideration during the consultation process outlined in stipulation 61:

    a. **Long-term cabins and campsites:** a 2-mile zone around the cabins and campsites.
    b. **Ikpikpuk River:** a 2-mile zone from the east bank of the river.
    c. **Miguakiak River:** a 3-mile zone from each bank of the river.
    d. **Fish Creek:** (1) a 3-mile zone from each bank downstream from Sec. 31. T11N, R1E; (2) a 2-mile zone from each bank in and upstream from Section 31, T11N, R1E.
    e. **Judy Creek:** a 2-mile zone from each bank of the creek.
    f. **Kogosukruk River:** a 2-mile zone from each bluff (or bank if there is no bluff) of the river (including the four tributaries off the southern bank) downstream from T. 2 N., R. 3 W., Umiat Meridian.
    g. **Kikiakrorak River:** a 2-mile zone from each bluff (or bank if there is no bluff) of the river downstream from T.2 N, R. 4 W., Umiat Meridian.
    h. **Colville River:** a 2-mile zone from the west bluff (or bank if there is no bluff) extending the length of river in the Colville River Raptor, Passerine, and Moose LUEA.

    In addition, a permittee or lessee engaged in oil and gas-related activity shall consult with the BLM, FWS, ADF&G, and the NSB regarding wildlife concerns prior to submitting a geophysical (i.e. seismic) permit, exploration plan, or development and production plan involving activity within the 2-mile zones around the Kogosukruk (and its tributaries), Kikiakrorak, and Colville Rivers described above. In the event that the permittee or lessee and the agencies are unable to reach agreement on steps necessary to address wildlife

concerns, the AO will consult with the other agencies and the permittee or lessee before making a determination on the adequacy of the measures taken to prevent conflicts with wildlife.

**Orientation Program:**

63. The lessee shall include in any application for permit to drill a proposed orientation program for all personnel involved in exploration or development and production activities (including personnel of lessee's agents, contractors, and subcontractors) for review and approval by the AO. The program shall be designed in sufficient detail to inform individuals working on the project of specific types of environmental, social, and cultural concerns that relate to the planning area. The program shall address the importance of not disturbing archaeological and biological resources and habitats, including endangered species, fisheries, bird colonies, and marine mammals and provide guidance on how to avoid disturbance. Guidance shall include the production and distribution of information cards on endangered and/or threatened species in the planning area. The program shall be designed to increase sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which personnel will be operating. The orientation program shall also include information concerning avoidance of conflicts with subsistence, commercial fishing activities, and pertinent mitigation.

    The program shall be attended at least once a year by all personnel involved in on-site exploration or development and production activities (including personnel of lessee's agents, contractors, and subcontractors) and all supervisory and managerial personnel involved in lease activities of the lessee and its agents, contractors, and subcontractors. Individual training is transferable from one facility to another except for elements of the training specific to a particular site.

    Lessees shall maintain a record onsite of all personnel who attend the program for so long as the site is active, though not to exceed the 5 most recent years of operations. This record shall include the name and dates(s) of attendance of each attendee.

**Traditional Land Use Sites:**

64. Lessees shall conduct an inventory of known traditional land use sites prior to any field activity. This inventory will be compiled from sites listed in the most current Traditional Land Use Inventory available from the NSB's Inupiat History, Language, and Cultural Commission, and shall be approved by the AO. Based on this inventory, the lessee shall develop a plan to avoid these sites and mitigate any potential damage that could result from field activities. The plan shall indicate how access to the site by local subsistence users will be provided. Lessees shall submit copies of the plan to BLM and the Subsistence Advisory Panel with any application for permit to drill.

**Other Activities:**

65. It is the responsibility of the authorized user to ensure that all individuals brought to the planning area under its auspices adhere to these stipulations. Authorized users of the planning area shall provide all employees, contractors, subcontractors, and clients with a briefing regarding stipulations applicable to the lease and/or permit. A copy of applicable stipulations will be posted in a conspicuous place in each work site and campsite.

66. The authorized user shall protect all survey monuments and be responsible for survey costs if remonumentation is required as a result of the user's actions.

67. All activities shall be conducted to avoid or minimize disturbance to vegetation.

68. The BLM, through the AO, reserves the right to impose closure of any area to operators in periods when fire danger or other dangers to natural resources are severe.

69. The authorized user shall be financially responsible for any damage done by a wildfire caused by its operations.

70. Construction camps are prohibited on frozen lakes and river ice. Siting of construction camps on river sand and gravel bars is allowed and, where feasible, encouraged. Where leveling of trailers or modules is required and the surface has a vegetative mat, leveling shall be accomplished through blocking rather than use of a bulldozer.

71. Use of pesticides without the specific authority of the AO is prohibited.

72. The feeding of wildlife by authorized users is prohibited.

73. Hunting and trapping by lessee's employees, agents, and contractors are prohibited when persons are on "work status." Work status is defined as the period during which an individual is under the control and supervision of an employer. Work status is terminated when the individual's shift ends and he/she returns to a public airport (e.g., Fairbanks, Barrow, Nuiqsut, or Deadhorse). Use of lessee facilities, equipment, or transport for personnel access or aid in hunting and trapping is prohibited.

74. Lessees shall conduct a cultural and paleontological resources survey prior to any ground-disturbing activity. Upon finding any potential cultural or paleontological resource, the lessee or their designated representative shall notify the AO and suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the AO.

75. Petroleum exploration and production activities are prohibited within ½ mile of occupied grizzly bear dens, identified by the ADF&G, unless alternative mitigation measures are approved by the AO in consultation with appropriate Federal, State, and NSB regulatory and resource agencies.

76. Oil and gas lessees and their contractors and subcontractors will prepare and implement bear-interaction plans to minimize conflicts between bears and humans. These plans shall include measures to: (a) minimize attraction of bears to the drill sites; (b) organize layout of buildings and work areas to minimize human/bear interactions; (c) warn personnel of bears near or on drill sites and identify proper procedures to be followed; (d) if authorized, deter bears from the drill site; (e) provide contingencies in the event bears do not leave the site or cannot be deterred by authorized personnel; (f) discuss proper storage and disposal of materials that may be toxic to bears; and (g) provide a systematic record of bears on the site and in the immediate area. The lessee's shall develop educational programs and camp layout and management plans as they prepare their lease operations plans. These plans shall be developed in consultation with appropriate Federal, State, and NSB regulatory and resource agencies and submitted to the AO.

77. Operators are encouraged to apply for a letter of authorization from the FWS to conduct activities in polar bear denning areas.

78. Permanent structures, other than oil and gas facilities, are prohibited within 100 feet of the highest high water mark of the nearest body of water.

79. Lessees shall use smokeless flares for handling routine conditions and use auxiliary smokeless flares for planned events that exceed the capacity of routine flares. Lessees shall use flares that meet the Federal New Source Performance design standards listed in 40 CFR 60.18.

APPENDIX B

# ANILCA SECTION 810 ANALYSIS OF SUBSISTENCE IMPACTS

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## APPENDIX B

# ANILCA § 810 ANALYSIS OF SUBSISTENCE IMPACTS

In 2000, the President created the National Energy Policy Development Group (NEPDG), consisting of the Vice-President and other key cabinet members. The primary task of the group was to "develop a national energy policy designed to help the private sector, and, as necessary and appropriate, state and local governments, and promote dependable, affordable, and environmentally sound production and distribution of energy for the future" (NEPDG 2001). In May 2001, The NEPDG released the National Energy Policy report, a comprehensive list of findings and key recommendations that were adopted and implemented by the President, and that form the basis of the President's National Energy Policy. Specifically, the policy directs the Secretary of the Interior to "consider additional environmentally responsible oil and gas development, based on sound science and the best available technology, through further lease sales in the National Petroleum Reserve – Alaska," and that "such consideration should include areas not currently leased within the northeast corner of the National Petroleum Reserve – Alaska." To this end, the Bureau of Land Management (BLM) initiated a process to amend the current Integrated Activity Plan for the Northeast Planning Area of the National Petroleum Reserve – Alaska.

Chapters 3 (Affected Environment) and 4 (Environmental Consequences) of the Northeast National Petroleum Reserve-Alaska Amended Integrated Activity Plan/Environmental Impact Statement (Amended IAP/EIS) provide a detailed description of both the affected environment of the Planning Area and the potential adverse effects of the various alternatives to subsistence. This appendix uses the detailed information presented in the Amended IAP/EIS to evaluate the potential impacts to subsistence pursuant to Section 810(a) of the Alaska National Interest Land Conservation Act (ANILCA).

## B.1 Subsistence Evaluation Factors

Section 810(a) of the ANILCA requires that an evaluation of subsistence uses and needs be completed for any federal determination to "withdraw, reserve, lease, or otherwise permit the use, occupancy or disposition of public lands." As such, an evaluation of potential impacts to subsistence under the ANILCA § 810(a) must be completed for the Amended IAP/EIS. The ANILCA requires that this evaluation include findings on three specific issues:

- The effect of use, occupancy, or disposition on subsistence uses and needs;
- The availability of other lands for the purpose sought to be achieved; and
- Other alternatives that would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes (16 USC § 3120).

The evaluation and findings required by the ANILCA § 810 are set out for each of the three alternatives considered in the Amended IAP/EIS.

A finding that the proposed action may significantly restrict subsistence uses imposes additional requirements, including provisions for notices to the State of Alaska and appropriate regional and local subsistence committees, a hearing in the vicinity of the area involved, and the making of the following determinations, as required by Section 810(a)(3):

- Such a significant restriction of subsistence uses is necessary, and consistent with sound management principles for the utilization of the public lands;
- The proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of use, occupancy, or other disposition; and

- Reasonable steps will be taken to minimize adverse effects upon subsistence uses and resources resulting from such actions.

To determine if a significant restriction of subsistence uses and needs may result from any one of the alternatives discussed in the Amended IAP/EIS, including their cumulative effects, the following three factors in particular are considered:

- The reduction in the availability of subsistence resources caused by a decline in the population or amount of harvestable resources;
- Reductions in the availability of resources used for subsistence purposes caused by alteration of their normal locations and distribution patterns; and
- Limitations on access to subsistence resources, including from increased competition for the resources.

A significant restriction to subsistence may occur in at least two instances: 1) when an action substantially reduces populations or their availability to subsistence users, and 2) when an action substantially limits access by subsistence users to resources. Chapter 3 (Affected Environment) of the Amended IAP/EIS provides information on areas and resources important for subsistence use, and the degree of dependence of affected villages on different subsistence populations. Chapter 4 (Environmental Consequences) provides much of the data on levels of reductions and limitations under each alternative, which was used to determine whether the action would cause a significant restriction to subsistence. The information contained in the Amended IAP/EIS is the primary data used in this analysis.

A subsistence evaluation and findings under ANILCA § 810 must also include a Cumulative Impacts analysis. Section B.2, below, begins with evaluations and findings for each of the four alternatives discussed in the Amended IAP/EIS. Finally, the most intensive cumulative case, as discussed in Chapter 4 (Environmental Consequences) of the Amended IAP/EIS, is evaluated. This approach helps the reader to separate the subsistence restrictions that would potentially be caused by activities proposed under the four alternatives from those that would potentially be caused by past, present, and future activities that could occur, or have already occurred, in the surrounding area.

When analyzing the effects of the four alternatives, particular attention is paid to those communities who have the potential to be most directly impacted by the proposed actions—Anaktuvuk Pass, Atqasuk, Barrow and Nuiqsut. These communities are located within or adjacent to the Northeast Planning Area, and are the same villages that were identified and analyzed during the 1998 Northeast IAP/EIS planning process, which the current plan is amending. The cumulative case expands the analysis to include the entire North Slope, including indirect effects to communities located in other areas of the state (i.e., the Yukon-Kuskokwim Delta), to assess any impacts to subsistence that may result because of negative effects to migratory subsistence species.

In addition to the ANILCA, Environmental Justice, as defined in Executive Order 12898, also calls for an analysis of the effects of federal actions on minority populations with regard to subsistence. Specifically, Environmental Justice is:

> The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Section 4-4 of Executive Order 12898, regarding the Subsistence Consumption of Fish and Wildlife, requires federal agencies to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence, and to communicate to the public any risks associated with the consumption patterns. To this end, the subsistence analyses of all alternatives, located in Chapter 4

(Environmental Consequences) of the Amended IAP/EIS, have been reviewed and found to comply with Environmental Justice.

# B.2 ANILCA § 810(a) Evaluations and Findings for All Alternatives and the Cumulative Case

The following evaluations are based on information relating to the environmental and subsistence consequences of alternatives A through D, and the cumulative case as presented in Chapter 4 (Environmental Consequences) of the Amended IAP/EIS. The stipulations discussed in Chapter 2 (Alternatives) of the Amended IAP/EIS are also considered for the alternatives to which they apply. The evaluations and findings focus on potential impacts to the subsistence resources themselves, as well as access to resources, and economic and cultural issues that relate to subsistence use.

## B.2.1 Evaluation and Findings for Alternative A (No Action Alternative)

Alternative A of the Amended IAP/EIS is the No Action Alternative. Selection of this alternative would result in continued management of the Northeast National Petroleum Reserve – Alaska as specified in the 1998 Northeast National Petroleum Reserve – Alaska IAP/EIS Record of Decision (ROD; 1998 Northeast IAP/EIS ROD). In effect, the No Action Alternative is the preferred alternative from the previous 1998 EIS, and as such, a subsistence evaluation as required by the ANILCA § 810 has already been completed. The evaluation and findings presented here reaffirm the previous conclusion that impacts to subsistence as a result of this alternative would be minimal.

### B.2.1.1 Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

Under the No Action Alternative, 13 percent of the Planning Area would remain unavailable (87 percent available) for oil and gas leasing, including much of the Teshekpuk Lake Special Area, and important waterfowl and caribou habitat. All of the special areas and site-specific prohibitions, as well as the 79 stipulations defined in the ROD, would remain in effect.

The analysis of the No Action Alternative on subsistence presented in Section 4.3.12 (No Action Alternative, Subsistence) considers the effects of non-oil and gas activities, the effects of oil and gas activities, the effects of oil spills, and the effectiveness of the stipulations and required operating procedures (ROPs) required by the BLM, as discussed in the 1998 Northeast IAP/EIS ROD. The analysis concludes that the No Action Alternative would have a negligible effect on subsistence species and on access to subsistence resources, and that mitigation measures developed by the BLM in conjunction with local communities would serve to minimize, to the extent possible, impacts to subsistence use by the communities of Anaktuvuk Pass, Nuiqsut, Atqasuk, or Barrow.

Effects to subsistence resources by non-oil and gas activities consist primarily of those actions associated with research. Numerous studies are conducted on a year-round basis on the North Slope, including aerial surveys by fixed-wing aircraft or helicopter, or ground surveys on foot or by off-highway vehicle (OHV), all of which have the potential to disturb animals. The most frequent complaint voiced by local subsistence users is that a large amount of aerial disturbance to animals occurs each field season in conjunction with scientific studies (Subsistence Advisory Panel [SAP] Minutes, June 6, 2002 meeting; SAP Minutes, August 22, 2002 meeting). Many of the scientific studies that currently occur are a result of stipulations imposed on oil and gas activities in the Planning Area; however, these same mandatory stipulations serve to minimize the potential effects of conducting research. Based on the analysis presented in Chapter 4 (Environmental Consequences), the effects of non-oil and gas activities on the species utilized by subsistence users is expected to be localized and short-term, and to have no regional population effects.

Oil and gas-related activities allowed under the No Action Alternative include seismic exploration, exploratory drilling, and development/production. Each of these activities has the potential to displace animals, with exploration potentially causing temporary displacement in the area of activity, and development/production potentially causing multi-year displacement during construction, and until the animal becomes habituated to the resultant infrastructure. Access by subsistence users could be impacted if the animals they wish to hunt have been displaced to areas much farther from their normal hunting grounds. However, many of the stipulations in the 1998 ROD would minimize the effects of oil and gas activities on animal populations, their range, and access to hunting areas by subsistence users (see Section 4.3.12.3, Effectiveness of Stipulations and Required Operating Procedures).

Oil spills have the potential to impact subsistence species as well as subsistence harvest patterns, depending on the amount and the location of the spill. Small spills are unlikely to cause great damage, especially if contained on land. Large spills are unlikely to occur during the exploration phase of oil development, but could occur once production infrastructure and facilities were in place. Several stipulations pertaining to spills and spill response are included under the No Action Alternative, which serve to reduce the potential impacts of oil spills to subsistence species and use.

As stated in Section 4.3.13.4 (Sociocultural Systems, Conclusion), the 1998 Northeast IAP/EIS ROD was the result of several years of collaboration between the communities near the Planning Area, local governments and agencies, and the BLM. The stipulations comprise essential protections for subsistence resources, cabins, camps, and river corridors, and also define the system of conflict negotiation to be used by permittees, leaseholders, subsistence users, and the BLM. Residents living on the North Slope, especially those in the village of Nuiqsut, view the 1998 stipulations, river setbacks, and designated special areas as a negotiated compromise between the Iñupiat people, the federal government, and the oil industry. Retention of the 1998 Northeast IAP/EIS ROD is favored by many individuals, local agencies, and local governments, as the 1998 Northeast IAP/EIS ROD is viewed as an effective plan that allows for oil and gas activity and the Iñupiat way of life to effectively coexist (ENSR 2004 *Public Scoping Summary Report for the Amendment to the National Petroleum Reserve – Alaska Integrated Activity Plan/Environmental Impact Statement*).

#### B.2.1.2 Evaluation of the Availability of Other Lands for Oil and Gas Exploration and Development

The Naval Petroleum Reserves Production Act of 1976 (NPRPA), as amended, gave the Secretary of the Interior the authority to conduct oil and gas leasing in the Northeast National Petroleum Reserve – Alaska. However, the law prohibited petroleum production from occurring in the National Petroleum Reserve – Alaska until authorized by Congress. In 1980, Congress granted that authorization and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the Reserve. The President's energy policy directs the Secretary of the Interior to "consider additional environmentally responsible oil and gas development, based on sound science and the best available technology, through further lease sales in the National Petroleum Reserve – Alaska." The BLM is undertaking this Amended IAP/EIS to fulfill the mandates of the President's energy policy, as well as the BLM's responsibilities to manage these lands under authority of the two laws above and other authorities cited elsewhere in this EIS. The No Action Alternative would continue the authorization of oil and gas exploration or development activities in the Northeast National Petroleum Reserve – Alaska under the 1998 Northeast IAP/EIS ROD. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have a low probability of containing sufficient quantities of oil or gas. State and Native Corporation Lands cannot be considered in a BLM plan, and under BLM policy other BLM lands outside of Alaska are not considered under the ANILCA.

#### B.2.1.3 Evaluation of Other Alternatives that Would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternatives that would reduce or eliminate the use of public lands needed for subsistence include: 1) making more land in the Northeast National Petroleum Reserve – Alaska unavailable for oil and gas leasing, or 2) not allowing

oil and gas activity to occur. Unfortunately, neither of these alternatives is viable, given the fact that Congress created the Northeast National Petroleum Reserve – Alaska as a petroleum reserve, with specific legislation that delineates its purpose and proposed use. Removing or changing its designation as a petroleum reserve would require another act of Congress. Additionally, the 1998 Northeast IAP/EIS ROD allowed the BLM to enter into contracts with several oil companies, by leasing land for oil and gas exploration. All of these leases are still in effect, and will not expire until 2008. Finally, the Secretary of the Interior has directed the BLM to look into additional lands in the Northeast National Petroleum Reserve – Alaska that may be made available for environmentally sound oil and gas leasing. Reducing the number of acres available for energy development would contradict this direction, and would go against the President's stated National Energy Policy. Section 2.4 (Alternatives Considered but Eliminated from Detailed Analysis) of the Amended IAP/EIS discusses other alternatives that were considered, but eliminated from detailed analysis.

### B.2.1.4 Findings

The No Action Alternative would not significantly restricting subsistence uses and needs. The impacts to subsistence resources and access discussed above would be minimal, or would be adequately mitigated by special area designation and stipulations under which the lessee/permittee must operate. This finding applies to Anaktuvuk Pass, Atqasuk, Barrow, and Nuiqsut.

## B.2.2 Evaluation and Findings for Alternative B

Alternative B, as well as the stipulations and ROPs accompanying it, takes into consideration all comments and concerns generated during the scoping process for the amendment, as well as the stated direction from the Secretary of the Interior to look at lands previously unavailable for leasing in the Planning Area. Alternative B of the Amended IAP/EIS makes 95.4 percent of all lands within the Planning Area available for oil and gas leasing, which includes approximately 387,000 acres that were formerly off-limits to leasing, including Teshekpuk Lake and lands north and east of the lake.

### B.2.2.1 Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The analysis of Alternative B on subsistence is presented in Section 4.4.12 (Alternative B, Subsistence). This analysis considers the effects of non-oil and gas activities, the effects of oil and gas activities, the effects of oil spills, and the effectiveness of the associated stipulations and ROPs as presented by the BLM. The analysis concludes that the effect of Alternative B would be greater than that of the No Action Alternative, but would remain localized and would not significantly affect subsistence species, access to subsistence resources, or subsistence use by the communities of Anaktuvuk Pass, Nuiqsut, Atqasuk, or Barrow.

At issue in this evaluation are the differences between the No Action Alternative and Alternative B, and whether these differences would be significant enough to cause a substantial impact to the populations of subsistence species, to displace these species from their current habitat, or to limit access to current, traditional hunting areas by subsistence users under Alternative B. Alternative B would primarily be different from the No Action Alternative in the following regards:

- Performance-based stipulations and ROPs would replace the 79 prescriptive stipulations in the 1998 Northeast IAP/EIS ROD. Stipulations refer to requirements that the leaseholder must comply with and are attached to the lease document, whereas ROPs are requirements that any operator working in the Northeast National Petroleum Reserve – Alaska must follow, and are attached to permits for activity.
- Some of the 79 stipulations from the 1998 Northeast IAP/EIS ROD that are already required by existing regulation or law would not have a corresponding stipulation or ROP under Alternative B. This does not mean that the lessee or permittee would be able to ignore the actions/activities covered by the original stipulations, only that these actions/activities would be covered by law or regulation, and, therefore, MUST be followed.

This approach would actually serve to strengthen the intent, in that lessees/permittees would not mistakenly believe that they could be granted an exception to the stipulation using the BLM exception process.

- An additional 387,000 acres located in the Teshekpuk Lake Special Area would be available for oil and gas leasing. However, within these additional acres, no permanent oil and gas facilities would be allowed within ¼ mile of the shore of identified goose-molting lakes, or within ¾ mile of the coast. Approximately 213,000 acres located in the goose molting/caribou habitat use area northeast of Teshekpuk Lake would remain unavailable for oil and gas leasing.
- Surface activity, including exploratory and delineation wells, would be allowed within the former "No Surface Activity" zone south of Teshekpuk Lake. However, the construction of permanent facilities would not be allowed until the lessee has conducted a study that includes a minimum of 3 year's worth of data on caribou movements.
- "Sensitive Area Consultation" zones from the 1998 Northeast IAP/EIS ROD would be replaced by ROP H-1, which requires consultation with the North Slope Borough (NSB), the Subsistence Advisory Panel, and affected communities, regardless of where the activity would take place.
- Permanent oil and gas facilities would not be allowed within ¼ mile of lakes identified as "Deep Water Lakes." The 1998 Northeast IAP/EIS ROD did not allow permanent facilities within ¼ mile of fish-bearing lakes in a large area south of Teshekpuk Lake, but each individual lake was not specifically identified.

Of the differences between alternatives A and B, only two would potentially cause Alternative B to substantially affect subsistence resources or their use: the availability of additional land for oil and gas leasing from within the Teshekpuk Lake Special Area, and the removal of the "No Surface Occupancy" zone south of Teshekpuk Lake. Other changes, such as updating the stipulations to conform to an adaptive management approach, would not reduce the level of protection afforded, as the ROPs would still specify the parameters by which the lessee/permittee would operate.

It is expected that impacts to terrestrial mammals and subsistence use in the vicinity of Teshekpuk Lake would be greater under Alternative B than under the No Action Alternative, particularly with respect to caribou calving and insect-relief habitat, given the additional 387,000 acres that would be available for oil and gas leasing. However, the 213,000 acres that would be unavailable to leasing are important to caribou migrating between calving and insect-relief areas and the wintering grounds. This area, as well as the stipulations that have been developed to further protect caribou found near Teshekpuk Lake, would serve to protect the resource from substantial decline at the population level (see Sections 4.4.9.1, Terrestrial Mammals, and 4.4.12.2, Subsistence, Oil and Gas Exploration and Development Activities). Impacts to vegetation, fish, birds, and other resources used for subsistence purposes are expected to be minor (see Sections 4.4.5, Vegetation; 4.4.7, Fish; 4.4.8, Birds; and 4.4.9, Mammals).

Under Alternative B, the greatest potential impact to subsistence use would be the removal of the "No Surface Activity" zone, which extends from the west side to the east side of the Planning Area in a band south of Teshekpuk Lake. Comments received during the scoping process for this amendment stressed the importance of protecting essential caribou movement/migration corridors, located both to the east and the west of Teshekpuk Lake. The construction of permanent facilities, such as pipelines, roads, and production pads, within these narrow corridors could result in displacement of the Teshekpuk Lake Caribou herd, if the caribou were unable to get to their known insect-relief habitat during periods of intense insect harassment. Furthermore, removal of the "No Surface Activity" zone, in addition to opening more lands for leasing, would allow permanent facilities to be constructed within much of the Teshekpuk Lake Herd calving area. While such construction might not affect the population of the herd, it could result in a dramatic shift in the current use-area of the caribou, resulting in displacement of the herd. Stipulation K-5 would serve to minimize the potential disturbance to caribou by requiring a 3-year study of caribou movements in the vicinity of the facility, before the BLM would authorize construction.

In addition to the potential displacement of subsistence resources under Alternative B, the elimination of the "No Surface Activity" zone, as well as the additional acres available for leasing, could result in future infrastructure

such as pipelines, roads, production pads, and wells. Oil industry infrastructure on the east side of the Colville River has resulted in the nonuse of this area by the residents of Nuiqsut, who do not feel comfortable hunting near or around oil developments. If enough economically recoverable oil was discovered to warrant additional development in the Nuiqsut, Atqasuk, or Barrow traditional subsistence use areas, hunters could avoid the development. The result would be an overall reduction in lands used for subsistence purposes. Effective communication and consultation by the oil industry, local communities, and the BLM would be essential when, and if, development were to occur in the National Petroleum Reserve – Alaska. Required Operating Procedures H-1 and H-2 would be the primary mitigation measures in place to ensure adequate access to traditional hunting areas by the residents of Nuiqsut, Barrow, and Atqasuk in the Teshekpuk Lake Special Area.

As stated in the evaluation for the No Action Alternative, residents living on the North Slope, especially those in the village of Nuiqsut, view the 1998 Northeast IAP/EIS ROD as a negotiated compromise between the Iñupiat people, the federal government, and the oil industry. Considerable changes to the decisions in the 1998 Northeast IAP/EIS ROD, without the consensus of local communities, governments, and agencies, could create an insurmountable rift between the people of the North Slope and the federal government, especially if their Iñupiat way of life was threatened.

#### B.2.2.2 Evaluation of the Availability of Other Lands for Oil and Gas Exploration and Development

The NPRPA, as amended, gives the Secretary of the Interior the authority to conduct oil and gas leasing in the National Petroleum Reserve – Alaska. However, the law prohibited petroleum production from occurring in the National Petroleum Reserve – Alaska until authorized by Congress. In 1980, Congress granted that authorization and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the Reserve. The President's energy policy directs the Secretary of the Interior to "consider additional environmentally responsible oil and gas development, based on sound science and the best available technology, through further lease sales in the National Petroleum Reserve – Alaska." The BLM is undertaking this Amended IAP/EIS to fulfill the mandates of the President's energy policy, as well as the BLM's responsibilities to manage these lands under authority of the two laws above and other authorities cited elsewhere in this Amended IAP/EIS. Alternative B would continue the authorization of oil and gas exploration or development activities in the National Petroleum Reserve – Alaska under performance-based stipulations identified in Section 2.6 (Stipulations and Required Operating Procedures) of the Amended IAP/EIS. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have a low probability of containing sufficient quantities of oil or gas. State and Native Corporation Lands cannot be considered in a BLM plan, and under BLM policy other BLM lands outside of Alaska are not considered under the ANILCA.

#### B.2.2.3 Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternatives that would reduce or eliminate the use of public lands needed for subsistence include: 1) making more land in the Northeast National Petroleum Reserve – Alaska unavailable for oil and gas leasing, or 2) not allowing oil and gas activity to occur. Unfortunately, neither of these alternatives is viable, given the fact that Congress created the National Petroleum Reserve – Alaska as a petroleum reserve, with specific legislation that delineates its purpose and proposed use. Removing or changing its designation as a petroleum reserve would require another act of Congress. Additionally, the 1998 Northeast IAP/EIS ROD allowed the BLM to enter into contracts with several oil companies, by leasing land for oil and gas exploration. All of these leases are still in effect, and will not expire until 2008. Finally, the Secretary of the Interior has directed the BLM to look into additional lands in the Northeast National Petroleum Reserve – Alaska that may be made available for environmentally sound oil and gas leasing. Reducing the number of acres available for energy development would contradict this direction, and would go against the President's stated National Energy Policy. Section 2.4 (Alternatives Considered but Eliminated from Detailed Analysis) of the Amended IAP/EIS discusses other alternatives that were considered, but eliminated from detailed analysis.

### B.2.2.4 Findings

Alternative B would not significantly restrict subsistence use by communities in or near the Planning Area (Anaktuvuk Pass, Atqasuk, Barrow, and Nuiqsut). The impacts to subsistence resources and access to resources would be minimal, yet displacement of the Teshekpuk Lake Herd caribou could occur. However, adequate stipulations and ROPs have been incorporated in Alternative B, including specific procedures for subsistence consultation with directly affected subsistence communities, and requirements for extensive studies of caribou movement, to ensure that significant restrictions to subsistence uses and needs would occur.

## B.2.3 Evaluation and Findings for Alternative C

Under Alternative C of the Amended IAP/EIS, all land under the stewardship of the BLM within the Planning Area would be available for oil and gas leasing. All of the stipulations and ROPs included in Alternative B would also apply to Alternative C.

### B.2.3.1 Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The analysis of the effects of Alternative C on subsistence, presented in Section 4.5.12 (Alternative C, Subsistence), considers the effects of non-oil and gas activities, oil and gas activities, and oil spills, and the effectiveness of the stipulations and ROPs required by the BLM. The analysis concludes that Alternative C would have a negligible effect on subsistence species, access to subsistence resources, or subsistence use by the communities of Anaktuvuk Pass, Atqasuk, Barrow, or Nuiqsut. Similarly, while all analysts feel that the impact of Alternative C would be greater than that of alternatives A or B, these impacts are still viewed as being localized, of short duration, and not significant at the population level for all species.

Analyses presented for individual subsistence species (e.g., marine mammals, land mammals, migratory waterfowl) also indicate that there would be negligible impacts to these species under Alternative C, predicting that only two caribou herds (the Teshekpuk Lake and the Western Arctic) would potentially be impacted or displaced by permanent facilities at the production stage of oil and gas development. Section 4.5.9 (Mammals) states:

> Caribou could be exposed to helicopter traffic and other human activities associated with resource inventories, seismic operations, exploratory drilling, and pipeline construction, but it is not expected that such exposure would have any effects at the population level. The Teshekpuk Lake Herd caribou movements within calving, insect-relief, and wintering areas could be disrupted by oil development activities, with unknown effects on the productivity of the herd.

However, most analysts feel that Alternative C's attached stipulations and ROPs effectively mitigate any potential impacts resulting from of oil and gas activity.

As discussed for Alternative B, eliminating the "No Surface Activity" zone, as well as making all lands available for leasing, could result in future infrastructure such as pipelines, roads, production pads, and wells. Oil industry infrastructure on the east side of the Colville River has resulted in the nonuse of this area by the residents of Nuiqsut, who do not feel comfortable hunting near or around oil developments. If enough economically recoverable oil was discovered to warrant additional development in the Nuiqsut, Atqasuk, or Barrow traditional subsistence use area, hunters could avoid the development. The result would be an overall reduction in lands used for subsistence purposes. Effective communication and consultation by the oil industry, local communities, and the BLM would be essential when and if development were to occur in the Northeast National Petroleum Reserve – Alaska. Required Operating Procedures H-1 and H-2 would be the primary mitigation measures in place to ensure adequate access to traditional hunting areas by the residents of Nuiqsut, Barrow, and Atqasuk in the Teshekpuk Lake Special Area.

As stated in the evaluations for alternatives A and B, residents living on the North Slope, especially those in the village of Nuiqsut, view the 1998 Northeast IAP/EIS ROD as a negotiated compromise between the Iñupiat people, the federal government, and the oil industry. Considerable changes to the decisions in the 1998 Northeast IAP/EIS ROD without the consensus of local communities, governments, and agencies to create an insurmountable rift between the people of the North Slope and the federal government, especially if their Iñupiat way of life was threatened.

#### B.2.3.2 Evaluation of the Availability of Other Lands for Oil and Gas Exploration and Development

The NPRPA, as amended, gave the Secretary of the Interior the authority to conduct oil and gas leasing in the Northeast National Petroleum Reserve – Alaska. However, the law prohibited petroleum production from occurring in National Petroleum Reserve – Alaska until authorized by Congress. In 1980, Congress granted that authorization and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the Reserve. The President's energy policy directs the Secretary of the Interior to "consider additional environmentally responsible oil and gas development, based on sound science and the best available technology, through further lease sales in the National Petroleum Reserve – Alaska." The BLM is undertaking this Amended IAP/EIS to fulfill the mandates of the President's energy policy as well as BLM's responsibilities to manage these lands under authority of the two laws above and other authorities cited elsewhere in this EIS. Alternative C would continue the authorization of oil and gas exploration or development activities in the Northeast National Petroleum Reserve – Alaska under performance-based stipulations identified in Section 2.6 (Stipulations and Required Operating Procedures) of the Amended IAP/EIS. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have a low probability of containing sufficient quantities of oil or gas. State and Native Corporation Lands cannot be considered in a BLM plan, and other BLM lands outside of Alaska are not considered under the ANILCA as per BLM Policy.

#### B.2.3.3 Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternatives that would reduce or eliminate the use of public lands needed for subsistence include: 1) making more land in the Northeast National Petroleum Reserve – Alaska unavailable for oil and gas leasing, or 2) not allowing oil and gas activity to occur. Unfortunately, neither of these alternatives is viable, given the fact that Congress created the National Petroleum Reserve – Alaska as a petroleum reserve, with specific legislation that delineates its purpose and proposed use. Removing or changing its designation as a petroleum reserve would require another act of Congress. Additionally, the 1998 Northeast IAP/EIS ROD allowed the BLM to enter into contract with several oil companies, by leasing land for oil and gas exploration. All of these leases are still in effect, and will not expire until 2008. Finally, the Secretary of the Interior has directed the BLM to look into additional lands in the Northeast National Petroleum Reserve – Alaska that may be made available for environmentally sound oil and gas leasing. Reducing the number of acres available for energy development would contradict this direction, and would go against the President's stated National Energy Policy. Section 2.4 (Alternatives Considered but Eliminated from Detailed Analysis) of the Amended IAP/EIS discusses other alternatives that were considered, but eliminated from detailed analysis.

#### B.2.3.4 Findings

Alternative C would not significantly restrict subsistence use by the communities of Anaktuvuk Pass, Atqasuk, Barrow, and Nuiqsut. The impacts to subsistence resources and access to resources would be minimal, yet displacement of the Teshekpuk Lake Herd could occur. However, adequate stipulations and ROPs have been incorporated, including specific procedures for subsistence consultation with directly affected subsistence communities, and requirements for extensive studies of caribou movement, to ensure that significant restrictions to subsistence uses and needs would not occur.

### B.2.4 Evaluation and Findings for Alternative D (Final Preferred Alternative)

Alternative D of the Amended IAP/EIS is the final Preferred Alternative. This alternative, as well as the stipulations and ROPs that accompany it, takes into consideration all comments and concerns generated during the draft EIS public meetings, as well as the ANILCA 810 Hearings that were held in Atqasuk, Anaktuvuk Pass, Barrow and Nuiqsut, as well as the stated direction from the Secretary of the Interior to look at lands previously unavailable for leasing in the Planning Area. The final Preferred Alternative of the Amended IAP/EIS makes approximately 4,389,000 acres or 95.4 percent of the area available for oil and gas leasing (approximately 389,000 more acres than under the No Action Alternative; Map 2-4). Under the final Preferred Alternative, Teshekpuk Lake (approximately 211,000 acres) is deferred from leasing for 10 years; this deferral would prevent exploratory drilling and pipeline construction, but current leases would not be affected by the deferral. The final Preferred Alternative also utilizes the same performance-based stipulations and ROPs developed for alternatives B and C. In addition, four new stipulations are proposed for the final Preferred Alternative. Three stipulations would prohibit permanent oil and gas facilities (No Surface Occupancy; NSO), excluding major rights-of-way (i.e., pipelines and major roads), on approximately 373,000 acres. Exploration activities would be allowed within this NSO, including seismic exploration and exploratory drilling. Three of the new stipulations were created to protect calving, post-calving, insect-relief, and migration habitat for caribou and molting habitat for geese. The fourth stipulation establishes a maximum limit of 300 acres of permanent surface disturbance from oil and gas activities within each of seven lease tracts identified north of Teshekpuk Lake, in an attempt to reduce the amount of land disturbed by oil and gas facilities.

#### B.2.4.1 Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The analysis of the final Preferred Alternative on subsistence is presented in Section 4.6.12 (Alternative D, Subsistence). This analysis considers the effects of non-oil and gas activities, the effects of oil and gas activities, the effects of oil spills, and the effectiveness of the associated stipulations and ROPs as presented by the BLM. The analysis concludes that the effect of the final Preferred Alternative would be greater than that of the No Action Alternative, and would remain localized and not significantly affect subsistence species as long as activity occurred outside of key habitat areas or migratory zones when animals were present. However, access to subsistence resources and an alteration in subsistence use patterns by the communities of Nuiqsut, Barrow, and possibly Atqasuk would likely result from future development occurring in currently used traditional harvest areas.

It is expected that impacts to terrestrial mammals and subsistence use in the vicinity of Teshekpuk Lake would be greater under the final Preferred Alternative than under the No Action Alternative, particularly with respect to caribou calving and insect-relief habitat, given the additional 389,000 acres that would be available for oil and gas leasing. However, limiting the amount of acreage available to permanent oil and gas activities in the seven new lease tract areas north of Teshekpuk Lake, as well as the two no surface occupancy areas located southeast and east of Teshekpuk Lake, serve to minimize potential impacts. Additionally, the stipulations that have been developed to protect caribou near Teshekpuk Lake, would serve to protect the resource from substantial decline at the population level (see Sections 4.6.9.1, Terrestrial Mammals, and 4.6.12.2, Subsistence, Oil and Gas Exploration and Development Activities), and Stipulation K-5 would serve to minimize the potential displacement of caribou by requiring a 3-year study of caribou movements in the vicinity of any facility before the BLM will authorize construction. Impacts to vegetation, fish, birds, and other resources used for subsistence purposes are expected to be minor (see Sections 4.6.5, Vegetation; 4.6.7, Fish; 4.6.8, Birds; and 4.6.9, Mammals).

The primary impact to subsistence use as a result of the final Preferred Alternative is the impact to the subsistence user, and not necessarily the resource. Oil industry infrastructure on the east side of the Colville River has resulted in the nonuse of this area by the residents of Nuiqsut, who do not feel comfortable hunting near or around oil developments. If enough economically recoverable oil was discovered to warrant additional development in the Nuiqsut, Atqasuk, or Barrow traditional subsistence use areas, history has shown that hunters would avoid the

development. The result would be an overall reduction in lands used for subsistence purposes. Effective communication and consultation by the oil industry, local communities, and the BLM would be essential when, and if, development were to occur in the National Petroleum Reserve – Alaska. Having two no surface occupancy areas, as well as limiting the number of acres available for permanent facilities north of Teshekpuk Lake helps to reduce this impact. Additionally, Required Operating Procedures H-1 and H-2, which call for additional consultation and notification by the oil companies to local communities, would help to alleviate access issues with regard to traditional hunting areas by the residents of Nuiqsut, Barrow, and Atqasuk in the Teshekpuk Lake Special Area.

#### B.2.4.2 Evaluation of the Availability of Other Lands for Oil and Gas Exploration and Development

The NPRPA, as amended, gave the Secretary of the Interior the authority to conduct oil and gas leasing in the Northeast National Petroleum Reserve – Alaska. However, the law prohibited petroleum production from occurring in National Petroleum Reserve – Alaska until authorized by Congress. In 1980, Congress granted that authorization and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the Reserve. The President's energy policy directs the Secretary of the Interior to "consider additional environmentally responsible oil and gas development, based on sound science and the best available technology, through further lease sales in the National Petroleum Reserve – Alaska."

The BLM is undertaking this Amended IAP/EIS to fulfill the mandates of the President's energy policy as well as BLM's responsibilities to manage these lands under authority of the two laws above and other authorities cited elsewhere in this EIS. The final Preferred Alternative would continue the authorization of oil and gas exploration or development activities in the Northeast National Petroleum Reserve – Alaska under performance-based stipulations identified in Section 2.6 (Stipulations and Required Operating Procedures) of the Amended IAP/EIS. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have a low probability of containing sufficient quantities of oil or gas. State and Native Corporation Lands cannot be considered in a BLM plan, and other BLM lands outside of Alaska are not considered under ANILCA as per BLM Policy.

#### B.2.4.3 Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternatives that would reduce or eliminate the use of public lands needed for subsistence include: 1) making more land in the Northeast National Petroleum Reserve – Alaska unavailable for oil and gas leasing, or 2) not allowing oil and gas activity to occur. Unfortunately, neither of these alternatives is viable, given the fact that Congress created the National Petroleum Reserve – Alaska as a petroleum reserve, with specific legislation that delineates its purpose and proposed use. Removing or changing its designation as a petroleum reserve would require another act of Congress. Additionally, the 1998 Northeast IAP/EIS ROD allowed the BLM to enter into contract with several oil companies, by leasing land for oil and gas exploration. All of these leases are still in effect, and will not expire until 2008. Finally, the Secretary of the Interior has directed the BLM to look into additional lands in the Northeast National Petroleum Reserve – Alaska that may be made available for environmentally sound oil and gas leasing. Reducing the number of acres available for energy development would contradict this direction, and would go against the President's stated National Energy Policy. Section 2.4 (Alternatives Considered but Eliminated from Detailed Analysis) of the Amended IAP/EIS discusses other alternatives that were considered, but eliminated from detailed analysis.

#### B.2.4.4 Findings

The final Preferred Alternative would not significantly restrict subsistence use by the communities of Anaktuvuk Pass, Atqasuk, Barrow, and Nuiqsut. The impacts to subsistence resources would be minimal, even though

displacement of the Teshekpuk Lake Herd could occur. Impacts to the subsistence user, including access, comprise the greatest potential impact, however, adequate stipulations and ROPs have been incorporated, including the designation of NSO zones south and east of Teshekpuk Lake, the limited amount of acres available for leasing in the seven new lease tracks north of Teshekpuk Lake, specific procedures for subsistence consultation with directly affected subsistence communities, and requirements for extensive studies of caribou movement, to ensure that significant restrictions to subsistence uses and needs would not occur.

## B.2.5 Evaluation and Findings for the Cumulative Case

The goal of the cumulative analysis is to evaluate the incremental impact of the current action in conjunction with all past, present, and reasonably foreseeable future actions in or near the Planning Area. The cumulative analysis considers in greatest detail activities that are more certain to happen, and activities that were identified as being of great concern during scoping. Oil and gas activities considered in the analysis include past development and production, present development, reasonably foreseeable future development, and speculative development. Activities not associated with oil and gas are also considered. All reasonably foreseeable future activities that may contribute to cumulative effects are considered in this analysis.

Actions included in the cumulative analysis include, but are not limited to the following:

- Offshore exploration and development in the Beaufort Sea;
- Currently-producing fields/developments (Prudhoe Bay, Kuparuk, Alpine, Meltwater);
- Possible future developments, such as the Alpine Satellite Development;
- Additional lease sales both on State of Alaska lands and in the Northwest National Petroleum Reserve - Alaska;
- The continuation of exploration on current leases in the Northeast National Petroleum Reserve - Alaska and additional lease sales in this same area; and
- The planned Alaska Department of Transportation access road to Nuiqsut.

### B.2.5.1 Evaluation of the Effect of Such Use, Occupancy, or Disposition on Subsistence Uses and Needs

Section 4.7 (Effects of the Cumulative Case) of the Amended IAP/EIS contains a detailed description of the cumulative-case scenario, including past effects, present effects, and the future possible oil field and infrastructure development that this evaluation uses. This assessment and finding assumes that all future development in the National Petroleum Reserve – Alaska would be subject to the stipulations and ROPs proposed in the Amended IAP/EIS. The cumulative analysis expands the area of potential impact beyond the Planning Area, to the entire North Slope Borough. Additionally, the impacts to subsistence use of migratory species, such as waterfowl, are also discussed.

The analysis of the effects of the cumulative case on subsistence presented in Section 4.7.7.12 (Analysis of Cumulative Effects by Resources, Subsistence) indicates that cumulative activity on the North Slope has the potential to significantly restrict subsistence use for the communities of Anaktuvuk Pass, Atqasuk, Barrow, and, especially, Nuiqsut. Planned development in the Northeast National Petroleum Reserve – Alaska extends from the Colville River Delta north of Nuiqsut to an area southwest of the village, which would effectively encircle the community, making it necessary for subsistence hunters traveling in nearly every direction to pass through some kind of development on the way to subsistence harvest areas. Because Iñupiat hunters are reluctant to use firearms near oil production facilities and pipelines, there would be a perceived barrier to harvest in these areas even if leaseholders did not object to harvester access. Subsistence users currently avoid the Kuparuk and Meltwater areas because of the physical barriers pipelines and elevated gravel roads pose to winter snowmachine travel, and have expressed concerns about hunting close to oil production and processing facilities because of perceived regulatory barriers (ENSR 2004). Additionally, many community members fear contamination of their subsistence resources by oil production facilities.

Subsistence resources also have the potential to be impacted under the cumulative case. As stated in Section 4.7.7.9:

> Cumulative effects on caribou distribution and abundance are likely to be long-term, lasting as long as the life of the oil fields. Any reduction in the calving and summer habitat use by cows and calves from future onshore leasing would represent a functional loss of habitat that could result in long-term effects on the caribou herds' productivity and abundance.

The effects of oil and gas activities in the National Petroleum Reserve – Alaska would be greatest on those herds that use the Planning Area, specifically the Teshekpuk Lake and the Western Arctic herds. Currently, the Teshekpuk Lake Herd is the primary source of caribou for the communities of Anaktuvuk Pass, Atqasuk, Barrow, Nuiqsut, and Wainwright. Any substantial decrease in the population numbers of this herd would have a substantial impact on all five communities. If the decrease occurred during times of unsuccessful bowhead whaling, the effects would be devastating for Atqasuk, Barrow, Nuiqsut, and Wainwright. The additional development pressure envisioned by the cumulative-case scenario could exacerbate changes in abundance and productivity of caribou, and these changes could, in turn, adversely affect subsistence harvests.

Impacts to migratory waterfowl, especially brant, have the potential to negatively affect subsistence hunters in the Southwest Region of Alaska, especially in the Yukon-Kuskokwim Delta (Y-K Delta). According to the Alaska Department of Fish and Game Community Profile Database, communities in this area are some of the largest users of migratory waterfowl, especially during the springtime, with this resource comprising between 1.6 percent to as much as 6.2 percent of their annual yearly harvest, depending on the community. The analysis of impacts to migratory waterfowl indicate that while there is the potential for there to be negative effects as a result of both non-oil and gas and oil and gas activity, these effects are primarily dependent upon loss of habitat as a result of construction activity. Given the fact that brant are the primary species of concern for the Y-K Delta with regard to this amendment, and comprise only one portion of their migratory bird harvest (at most 3 percent, according to ADFG), potential impacts as a result of this plan do not constitute a significant restriction of subsistence use.

Any future gravel roads built from the National Petroleum Reserve – Alaska or any other North Slope development to the existing haul road could allow access to sport hunters, particularly if there were no restrictions on hunting from or near the roads. Any increase in the numbers of hunters in the area would increase competition for caribou, moose, fish, or other subsistence resources.

The offshore development and transport that is possible under a cumulative case could result in oil spills in the marine environment. Any oil spill that tainted, or was perceived to taint, whales or other marine mammals of importance to subsistence users would have a significant negative effect on those users. If such a spill affected migration patterns or distributions of any marine mammal used for subsistence, it would also have significant negative effect on subsistence users.

From 1990 to 1997, the North Slope's permanent population grew at an annual rate of 2.7 percent, and Nuiqsut was the fastest growing village. This rate of growth could continue for the foreseeable future with or without the development envisioned in the cumulative scenario discussed. The effects of such growth on competition for subsistence resources are difficult to predict, but it is possible that over time there would be increased competition among local subsistence users. It is unlikely that the transient workers associated with oil and gas development would add to the competition, because they are ineligible for the subsistence priority under existing federal regulations.

#### B.2.5.2 Evaluation of the Availability of Other Lands for Oil and Gas Exploration and Development

The NPRPA, as amended, gives the Secretary of the Interior the authority to conduct oil and gas leasing in the National Petroleum Reserve – Alaska. However, the law prohibited petroleum production from occurring in National Petroleum Reserve – Alaska until authorized by Congress. In 1980, Congress granted that authorization

and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the Reserve. The President's energy policy directs the Secretary of the Interior to "consider additional environmentally responsible oil and gas development, based on sound science and the best available technology, through further lease sales in the National Petroleum Reserve – Alaska." The BLM is undertaking this Amended IAP/EIS to fulfill the mandates of the President's energy policy as well as BLM's responsibilities to manage these lands under authority of the two laws above and other authorities cited elsewhere in this Amended IAP/EIS. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have a low probability of containing sufficient quantities of oil or gas. State and Native Corporation Lands cannot be considered in a BLM plan, and other BLM lands outside of Alaska are not considered under the ANILCA as per BLM Policy.

#### B.2.5.3 Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternatives that would reduce or eliminate the use of public lands needed for subsistence include: 1) making more land in the Northeast National Petroleum Reserve – Alaska unavailable for oil and gas leasing, or 2) not allowing oil and gas activity to occur. Unfortunately, neither of these alternatives is viable, given the fact that Congress created the National Petroleum Reserve – Alaska as a petroleum reserve, with specific legislation that delineates its purpose and proposed use. Removing or changing its designation as a petroleum reserve would require another act of congress. Furthermore, the 1998 Northeast IAP/EIS ROD allowed the BLM to enter into contract with several oil companies, by leasing land for oil and gas exploration. All of these leases are still in effect, and will not expire until 2008. Finally, the Secretary of the Interior has directed the BLM to look into additional lands in the Northeast National Petroleum Reserve – Alaska that may be made available for environmentally sound oil and gas leasing. Reducing the number of acres available for energy development would contradict this direction, and would go against the President's stated National Energy Policy. Section 2.4 (Alternatives Considered but Eliminated from Detailed Analysis) of the Amended IAP/EIS discusses other alternatives that were considered, but eliminated from detailed analysis.

#### B.2.5.4 Findings

The cumulative case, as presented in this analysis, would result in a reasonably foreseeable and significant restriction of subsistence use for the communities of Anaktuvuk Pass, Atqasuk, Barrow, and Nuiqsut, due to a decrease in resource abundance, significant alteration in the distribution of resources, and a significant restriction on the access of subsistence users. This finding requires a positive determination pursuant to the ANILCA § 810.

The distribution of caribou populations on the North Slope has been affected by Prudhoe Bay development, and access to subsistence resources has been compromised there. Although procedures will be in place to ensure that future development affects access as little as possible, it is still probable the total area available for subsistence purposes will be reduced. If a major oil spill were to occur in the future, it could significantly affect both populations and distributions of fish, and whales and other marine animals, causing significant restrictions to subsistence resources. Oil and gas infrastructure located in core caribou calving or insect-relief areas would result in the displacement, and possible reduction, of the herd. Population growth would result in a greater number of residents relying on local resources to meet their needs. In addition, construction of a road that would allow access to the area could cause an increase in competition for subsistence resources by sport hunters. These restrictions have the potential to affect Anaktuvuk Pass, Barrow, Atqasuk, and Nuiqsut.

## B.3 Notice and Hearings

The ANILCA § 810(a) provides that no "withdrawal, reservation, lease, permit, or other use, occupancy or disposition of the public lands which would significantly restrict subsistence uses shall be effected" until the federal agency gives the required notice and holds a hearing in accordance with ANILCA § 810(a)(1) and (2). The

BLM provided notice in the *Federal Register* that it has made positive findings pursuant to ANILCA § 810 that the cumulative case presented in the Amended IAP/EIS meets the "may significantly restrict" threshold. As a result, public hearings were held in the potentially affected communities of Anaktuvuk Pass, Atqasuk, Nuiqsut, and Barrow. Notice of these hearings were in the *Federal Register* and by way of the local media, including the *Arctic Sounder* newspaper and KBRW, the local Barrow radio station, with coverage to all villages on the North Slope.

# B.4 Subsistence Determinations Under the ANILCA § 810(a)(3)(A), (B), and (C)

The ANILCA § 810(a) provides that no "withdrawal, reservation, lease, permit, or other use, occupancy or disposition of the public lands which would significantly restrict subsistence uses shall be effected" until the federal agency gives the required notice and holds a hearing in accordance with the ANILCA §810(a)(1) and (2), and makes the three determinations required by the ANILCA § 810(a)(3)(A), (B), and (C). The three determinations that must be made are: 1) that such a significant restriction of subsistence use is necessary, consistent with sound management principles for the utilization of the public lands; 2) that the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other such disposition; and 3) that reasonable steps will be taken to minimize adverse impacts to subsistence uses and resources resulting from such actions [16 U.S.C. § 3120(a)(3)(A), (B), and (C)].

The BLM has found in this subsistence evaluation that the cumulative case considered in this Amended IAP/EIS would significantly restrict subsistence uses. Therefore, BLM undertook the notice and hearing procedures required by ANILCA § 810 (a)(1) and (2) in conjunction with release of the Draft Amended IAP/EIS in order to solicit public comment from the potentially affected communities and subsistence users.

The determinations below satisfy the requirements of ANILCA § 810(a)(3)(A), (B), and (C).

## B.4.1 A. Significant Restriction of Subsistence Use is Necessary, Consistent with Sound Management Principles for the Utilization of Public Lands.

The BLM has prepared this Amended IAP/EIS to fulfill the mandates of the President's energy policy and the responsibility to mange the National Petroleum Reserve – Alaska under the authority of two laws passed in 1976—The Naval Petroleum Reserves Production Act (NPRPA) and the Federal Land Policy and Management Act (FLPMA). The President's energy policy directs the Secretary of the Interior to "consider additional environmentally responsible oil and gas development, based on sound science and the best available technology." The NPRPA authorizes and directs the Secretary of the Interior to "further explore, develop and operate" the National Petroleum Reserve-Alaska (10 U.S.C. § 7421). At the same time, the statute also requires that all oil and gas activities "undertaken pursuant to this section shall include or provide for such conditions, restrictions, and prohibitions as the Secretary deems necessary or appropriate to mitigate reasonably foreseeable and significantly adverse effects on the surface resources" of the National Petroleum Reserve – Alaska (42 U.S.C. § 6508).

It was in furtherance of these objectives, together with other management guidance found in the NPRPA, FLPMA, NEPA, and ANILCA that this Amended IAP/EIS was undertaken. After considering a broad range of alternatives, a final Preferred Alternative was developed that serves to make available additional lands for environmentally responsible oil and gas exploration and development, through further lease sales in the National Petroleum Reserve – Alaska, while minimizing impacts to important subsistence resources and subsistence-use areas. The resulting final Preferred Alternative considers the necessity for economically feasible development while providing effective protections to minimize any impacts on subsistence resources and uses. Under the final Preferred Alternative, the performance-based stipulations and ROPs which accompany the final Preferred Alternative serve as the primary mitigation measures to be used to reduce the impact of the proposed activity on subsistence resources.

The BLM has considered and balanced a variety of factors with regard to the proposed activity on public lands, including, most prominently, the comments received during the public meetings and hearings which stressed the importance of protecting essential caribou movement/migration corridors, located to the east of Teshekpuk Lake. The BLM has determined that the significant restriction that may occur under the final Preferred Alternative, when considered together with all the possible impacts of the cumulative case, is necessary, consistent with sound management principles for the use of these public lands, and for BLM to fulfill the management goals for the Planning Area as guided by the statutory directives in the NPRPA, FLPMA, and other applicable laws.

### B.4.2 B. The Proposed Activity will Involve the Minimal Amount of Public Lands Necessary to Accomplish the Purposes of such Use, Occupancy or Other Disposition.

The BLM has determined that the final Preferred Alternative involves the minimal amount of public lands necessary to accomplish the purposes of the final Preferred Alternative—which is to make additional lands available for oil and gas leasing in the Northeast National Petroleum Reserve – Alaska. Alternatives that varied between opening no additional lands, some additional lands, or all lands to leasing were analyzed. The final Preferred Alternative allows additional leasing in less-sensitive areas west of Teshekpuk Lake, and creates seven new large lease tracts north of the lake that have a limited amount of acres available for surface occupancy. In addition, Teshekpuk Lake has been deferred from leasing for 10 years.

### B.4.3 C. Reasonable Steps will be Taken to Minimize Adverse Impacts upon Subsistence Uses and Resources Resulting from such Actions.

When BLM began its NEPA scoping process for the current plan amendment, it internally identified subsistence as one of the major issues to be addressed. In order to assure that the best and most up-to-date and reliable information was available, a subsistence specialist (Stephen Braund and Associates) was contracted to conduct the analysis of impacts to subsistence, including access, harvests, and traditional use patterns. This information, as well as the results of public scoping meetings in the villages of the North Slope, meetings with the National Petroleum Reserve – Alaska Subsistence Advisory Panel, and consultation with tribal and local governments, was used to craft the final Preferred Alternative. In addition, the BLM took into consideration comments from villages and individuals of the North Slope during the ANILCA Subsistence Hearings. This information resulted in several modifications to the former preferred alternative, and resulted in Alternative D, the final Preferred Alternative. These modifications include:

- Allowing only up to 300 acres of total disturbance as a result of permanent oil and gas facilities in each of the seven new large lease tracts north of Teshekpuk Lake;
- The No Surface Occupancy zone that excludes permanent oil and gas facilities including pipelines and roads located in the primary migration/travel corridor for the Teshekpuk Lake Herd east of Teshekpuk Lake;
- The No Surface Occupancy zone located southeast of Teshekpuk Lake;
- Stipulations H-1 and H-2, which require additional consultation/notification efforts by the oil industry to potentially affected communities; and
- Various K-stipulations, which protect specific resources and habitat necessary for subsistence use.

Given these steps, as well as the other performance-based stipulations and ROPs the BLM has determined that the final Preferred Alternative includes all reasonable steps to minimize adverse impacts on subsistence uses and resources.

APPENDIX C

# FEDERAL, STATE, AND LOCAL PERMITS AND/OR APPROVALS FOR OIL AND GAS EXPLORATION, DEVELOPMENT, AND PRODUCTION ACTIVITIES

# APPENDIX C

# FEDERAL, STATE, AND LOCAL PERMITS AND/OR APPROVALS FOR OIL AND GAS EXPLORATION, DEVELOPMENT, AND PRODUCTION ACTIVITIES

The following table summarizes permit and other requirements that must be met before oil and gas exploration or development activities may occur. Some obligations would be placed directly on the applicant. Others would be required of federal agencies prior to granting authorizations to oil and gas companies.

| Regulatory Agency | Permit/Approval Actions/Requirements |
|---|---|
| | **FEDERAL** |
| **U.S. Army Corps of Engineers (USACE)** | • Issues a Section 404 permit under the Federal Water Pollution Control Act of 1972, as amended (Clean Water Act; 33 USC § 1344) for discharge of dredged and fill material into U.S. waters, including wetlands.<br>• Issues a Section 10 permit under the Rivers and Harbors Appropriations Act of 1899 (33 USC § 403) for structures or work in, of affecting, navigable waters of the U.S.<br>• Issues a Section 103 Ocean Dumping permit under Section 103 of the Marine Protection Research and Sanctuaries Act of 1972 (33 USC § 1413) for transport of dredged material for ocean disposal. |
| **U.S. Environmental Protection Agency (USEPA)** | • Issues a National Pollutant Discharge and Elimination System (NPDES) permit under Section 402, Federal Water Pollution Control Act of 1972, as amended (Clean Water Act; 33 USC § 1251) for discharges into waters of the U.S.<br>• Issues an Underground Injection Control Class 1 Industrial Well permit under the Safe Drinking Water Act (42 USC § 300f; 40 CFR parts 144 and 146) for underground injection of Class I (industrial) waste materials.<br>• Requires a Spill Prevention Containment and Countermeasure (SPCC) Plan under Section 311 of the Federal Water Pollution Control Act of 1972, as amended (Clean Water Act; 40 CFR part 112) for storage of over 660 gallons of fuel in a single container or over 1,320 gallons in aggregate in tanks above ground.<br>• Conducts a review and evaluation of the Draft and Final EIS for compliance with CEQ guidelines (40 CFR parts 1500-1508) and Section 309 of the Clean Air Act.<br>• Authority delegated to ADEC to issue air quality permits for facilities operating within state jurisdiction, including a Title V operating permit and a Prevention of Significant Deterioration (PSD) permit under the Clean Air Act, as amended (42 USC § 7401), to address air pollutant emissions. |
| **National Oceanic and Atmospheric Administration (NOAA) Fisheries Service (formerly National Marine Fisheries Service [NMFS])** | • Provides consultation under the Endangered Species Act of 1973, Section 7(a)(2) regarding effects to threatened or endangered species.<br>• Provides consultation under the Magnuson-Stevens Fishery Management and Conservation Act for effects on Essential Fish Habitat.<br>• Provides consultation under the Fish and Wildlife Coordination Act regarding effects on fish and wildlife resources.<br>• Provides consultation under the Marine Mammal Protection Act regarding effects on marine mammals.<br>• Issues Incidental Harassment Authorization under the Marine Mammal Protection Act for incidental takes of protected marine mammals (bowhead whales and ringed seals). |

| Regulatory Agency | Permit/Approval Actions/Requirements |
|---|---|
| **U.S. Department of the Interior, Bureau of Land Management (USDOI BLM)** | • Reviews and approves Applications for Permit to Drill (including drilling plans and surface-use plans of operations) and Subsequent Well Operations as prescribed in 43 CFR part 3160, under authority of the Naval Petroleum Reserves Production Act of 1976(42 USC §§ 6501-6508) and other federal laws, for development and production of federal leases.<br>• Approves lease administration requirements including Unit Agreements and Plans of Development, Communitization Agreements, and Participating Area Determinations, as described in 43 CFR §§ 3130 and 3180, under the Mineral Leasing Act of 1920 (30 USC § 181 et seq.), Federal Oil and Gas Royalty Management Act of 1982 (43 USC § 1710 et seq.), Naval Petroleum Reserve Production Act of 1976 (42 USC § 6504), Department of the Interior Appropriations Act, Fiscal Year 1981, and other federal laws, for exploration and development of oil and gas leases.<br>• Issues geophysical permits to conduct seismic activities as described in 43 CFR part 3150, under authority of the Mineral Leasing Act of 1920 (30 USC § 181 et seq.), Alaska National Interest Lands Conservation Act (16 USC § 3101 et seq.), Federal Land Policy and Management Act of 1976 (43 USC § 1701 et seq.), Naval Petroleum Reserves Production Act of 1976 (42 USC § 6504), and Department of the Interior Appropriations Act, Fiscal Year 1981.<br>• Issues rights-of-way grants and temporary use permits for the construction, operation, and maintenance of pipeline, production, and related facilities under the Naval Petroleum Reserve Production Act of 1976 (42 USC §§ 6501-6508).<br>• Delegates authority to ADEC for review and approval of Oil Discharge Prevention and Contingency Plans and Certification of Financial Responsibility for accidental oil discharge into navigable waters under Section 4202(b)(4) of the Oil Pollution Act of 1990 (OPA90), and Section 311(j)(5) of the Federal Water Pollution Control Act (30 CFR § 254). |
| **U.S. Fish and Wildlife Service (USFWS)** | • Provides consultation under the Endangered Species Act of 1973, Section 7(a)(2) regarding effects to threatened or endangered species.<br>• Provides consultation under the Fish and Wildlife Coordination Act regarding effects to fish and wildlife resources.<br>• Issues a Letter of Authorization under the Marine Mammal Protection Act for incidental takes of marine mammals. |
| **STATE** | |
| **Alaska Department of Environmental Conservation (ADEC)** | • Issues a Certificate of Reasonable Assurance for discharge of dredged and fill material into U.S. waters under Section 401, Federal Water Pollution Control Act of 1972, as amended in 1977 (Clean Water Act; 33 USC § 1341 et seq.); AS 46.03.020; 18 AAC chapters 15, 70, and 72.<br>• Issues a Certificate of Reasonable Assurance/NPDES and Mixing Zone Approval for wastewater disposal into all state waters under Section 402, Federal Water Pollution Control Act of 1972, as amended (Clean Water Act; 33 USC § 1341 et seq.); AS 46.03.020, .100, .110, .120, and .710; 18 AAC chapters, 10, 15, and 70, and ; § 72.500.<br>• Issues a Class I well wastewater disposal permit for underground injection of non-domestic wastewater under AS 46.03.020, .050, and .100.<br>• Reviews and approves all public water systems including plan review, monitoring program, and operator certification under AS 46.03.020, .050, .070, and .720, 18 AAC § 80.005.<br>• Approves domestic wastewater collection, treatment, and disposal plans for domestic wastewaters (18 AAC chapter 72).<br>• Approves financial responsibility for cleanup of oil spills (18 AAC chapter 75).<br>• Reviews and approves the Oil Discharge Prevention and Contingency Plan and the Certificate of Financial Responsibility for storage or transport of oil under |

| Regulatory Agency | Permit/Approval Actions/Requirements |
|---|---|
| **ADEC (Continued)** | AS 46.04.030 and 18 AAC chapter 75. The State review applies to oil exploration and production facilities, crude oil pipelines, oil terminals, tank vessels and barges, and certain non-tank vessels.<br>• Issues a Title V Operating Permit and a PSD permit under Clean Air Act Amendments (Title V) for air pollutant emissions from construction and operation activities (18 AAC chapter 50).<br>• Issues solid waste disposal permit for state lands under AS 46.03.010, 020, 100, and 110; AS 46.06.080; 18 AAC § 60.005; and 200.<br>• Reviews and approves solid waste processing and temporary storage facilities plan for handling and temporary storage of solid waste on federal and state lands under AS 46.03.005, 010, and 020; and 18 AAC § 60.430.<br>• Approves the siting of hazardous waste management facilities. |
| **Alaska Oil and Gas Conservation Commission (AOGCC)** | • Issues a Permit to Drill under 20 AAC § 25.05.<br>• Issues approval for annular disposal of drilling waste (20 AAC § 25.080).<br>• Authorizes Plugging, Abandonment, and Location Clearance (20 AAC § 25.105 through 25.172).<br>• Authorizes Production Practices (20 AAC §§ 25.200 through 25.245).<br>• Authorizes Class II Waste Disposal and Storage (20 § AAC 25.252).<br>• Approves Workover Operations (20 § AAC 25.280).<br>• Reports (20 AAC §§ 25.300 through 25.320).<br>• Authorizes Enhanced Recovery Operations under 20 AAC § 25.402 through 25.460. |
| **Alaska Department of Natural Resources (ADNR)** | • Conducts a Coastal Zone Consistency review and issues determination of consistency of proposed development within the coastal zone under Coastal Zone Management Act of 1972, as amended in 1976 (16 USC § 1451 et seq.); Alaska Coastal Management Program Act of 1977 (AS 46.40); and 6 AAC chapter 50.<br>• Issues a Material Sales Contract for mining and purchase of gravel from state lands under AS 38.05.850; and 11 AAC §§ 71.070 and .075.<br>• Issues Rights-of-Way (ROW) and Land Use permits for use of state land, ice road construction on state land, and state freshwater bodies under AS 38.05.850.<br>• Issues a Temporary Water Use and Water Rights permit under AS 46.15 for water use necessary for construction and operations.<br>• Issues pipeline ROW leases for pipeline construction and operation across state lands under AS 38.35.020.<br>• Issues a Cultural Resources Concurrence for developments that may affect historic or archaeological sites under the National Historic Preservation Act of 1966, as amended (16 USC § 470 et seq.), Alaska Historic Preservation Act (AS 41.35.010 through .240).<br>• Issues Fish Habitat Permits under AS 41.l4.84O and AS 41.l4.870 for activities within streams used by fish that agency determines could represent impediments to fish passage, or for travel in, excavation of, or culverting of anadromous fish streams. |
| **BOROUGH** | |
| **North Slope Borough (NSB)** | • Issues a Coastal Zone Consistency Determination to address project planning or development within the coastal zone under the Coastal Zone Management Act of 1972, as amended in 1976 (16 USC § 1451); Alaska Coastal Management Program, 1977 (AS 46.40); Borough Ordinance 90-39.<br>• Issues Development Permits for oil and gas projects under NSB Code of Ordinance Title 19. |

APPENDIX D

# ENDANGERED AND THREATENED SPECIES CONSULTATION AND FINAL BIOLOGICAL ASSESSMENT

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Alaska State Office
222 West Seventh Avenue, #13
Anchorage, Alaska 99513-7599
http://www.ak.blm.gov

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6840(931)

Mr. James Balsinger
Regional Administrator, Alaska Region
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

Dear Mr. Balsigner:

The United States Department of the Interior (USDOI), Bureau of Land Management (BLM) has initiated the process to amend the 1998 Northeast National Petroleum Reserve-Alaska Integrated Activity Plan/Environmental Impact Statement (IAP/EIS). The BLM is amending this existing plan to consider opening a portion of BLM-administered lands (public lands) that are currently unavailable for oil and gas leasing in the Northeast portion of the National Petroleum Reserve-Alaska (Northeast Planning Area). In addition, the BLM proposes to develop performance-based lease stipulations and Required Operating Procedures (ROPs) in the Northeast Planning Area similar to those stipulations and ROPs included in the Northwest National Petroleum Reserve–Alaska IAP/EIS Record of Decision (Northwest IAP/EIS ROD; USDOI BLM and MMS 2004).

The management plan will fulfill BLM's responsibility for managing lands in the Northeast Planning Area. The plan also fulfills mandates of the President's energy policy to undertake "environmentally responsible oil and gas development in the National Petroleum Reserve-Alaska." In 2002, the President's National Energy Policy Development Group recommended that the President direct the Secretary of the Interior to "consider additional environmentally responsible oil and gas development, based on sound science and the best available technology, through further lease sales in the Petroleum Reserve" and that "such consideration should include areas not currently leased within the northeast corner of the Petroleum Reserve".

Congress first authorized an oil and gas leasing program in the Northeast Planning Area in 1981. The BLM completed an Environmental Assessment (EA) of the Northeast Planning Area in 1981, and an EIS in 1983 (USDOI BLM 1983) that deleted some areas from leasing and recommended stipulations, especially in areas with high surface values. A total of four lease sales were held during 1982 to1985, resulting in the drilling of a single well that was abandoned as a dry hole in 1985.

As a result of renewed interest in the Northeast Planning Area, and the need to update the environmental analysis of potential impacts from oil and gas development, the BLM began an assessment in 1997 of the potential impacts from oil and gas development in the Northeast portion of the Petroleum Reserve, including all lands in the Petroleum Reserve east of the Northwest National Petroleum Reserve-Alaska. The Northeast Plan culminated in a ROD in October 1998 that superseded the decisions of the 1983 EIS and included a decision to make approximately 4 million of the 4.6 million acres available for oil and gas leasing (USDOI BLM and MMS 1998).

Among other decisions, this document made approximately 87 percent of the Northeast Planning Area available for leasing, while approximately 600,000 acres in the Teshekpuk Lake area remained unavailable for leasing and an additional 240,000 acres were restricted to leasing with no permanent facilities and no exploratory wells. The area that is closed to leasing near Teshekpuk Lake is an area with especially high oil and gas potential. By excluding these areas from future oil and gas leasing, approximately 2 billion of the estimated 3.2 billion barrels of technically recoverable oil in the Northeast Planning Area was made unavailable. The 1998 Northeast IAP/EIS ROD also contained a set of prescriptive-based stipulations to protect natural and cultural resources.

In the five years since the completion of the 1998 Northeast ROD, the BLM has held oil and gas lease sales, leasing 133 tracts in 1999, and leasing an additional 60 tracts in 2002. Many lease tracts were sold around the perimeter of the Teshekpuk Lake area. Since the initial lease sale, industry has completed many miles of seismic lines and drilled 14 exploratory wells. ConocoPhillips Alaska, Incorporated has proposed development of five drilling pads that would be satellites to its Alpine field, near the village of Nuiqsut. Two of the pads would be on public lands within the Northeast Planning Area.

To assess opportunities for oil and gas production on federal lands in the Northwest portion of the National Petroleum Reserve–Alaska (Northwest Planning Area), the BLM began assessing the potential impacts from oil and gas development in the Northwest Planning Area in 2001. The Northwest IAP/EIS was completed in December 2003 (USDOI BLM and MMS 2003) and culminated in a ROD in January 2004 that superseded the decisions of the 1983 EIS and included a decision to make 8.8 million acres available for oil and gas leasing. The ROD also contained a set of performance-based stipulations to protect natural and cultural resources in the Northwest Planning Area. These stipulations differ from those developed for the 1998 Northeast IAP/EIS in that they:

1. Do not include actions that already exist in the form of regulation or law;
2. Are reformatted into logical groupings, or Required Operating Procedures; and
3. Provides the BLM and other land users, including industry, greater flexibility by emphasizing the intent or objective of the mitigation to protect the environment.

To carry out its management responsibilities and respond to the Presidential and Congressional directives to the Secretary of the Interior, the BLM is proposing to amend its 1998 Northeast IAP/EIS to:

1. Consider leasing portions of lands currently closed to oil and gas leasing in the Northeast National Petroleum Reserve-Alaska;
2. Develop performance-based measures to protect important surface resources from the impacts of oil and gas activities, similar to those developed for the Northwest National Petroleum Reserve–Alaska.

The BLM is committed to ensuring that ecosystems in all portions of the National Petroleum Reserve-Alaska remain healthy and productive. The amended plan includes various current and future land based surface-impacting activities that may affect some species within the Northeast Planning Area of the Petroleum Reserve, and could result in an increase in marine barge traffic in the offshore environment. However, the increase in marine traffic would be minimal during the exploration phase, and is expected to have no impact on marine listed species. If development should result from successful exploration, its impacts would be analyzed in future National Environmental Policy Act compliance and Section 7, Endangered Species Act requirements.

Your staff has reviewed the amendment and preferred alternative. The Bureau of Land Management requests a letter of concurrence to conclude this informal Section 7 consultation

If you have any questions, please contact John Payne (907) 271-3431.

Henri R. Bisson
State Director

2 Enclosures
1 - Notice of Intent (2 pp)
2 - General Lease Stipulations and Required Operating Procedures (21 pp)

cc:
Project Manager, Northeast Petroleum Reserve-Alaska Plan Amendment

931:SChilds:sc:1985:4/30/04:

# United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Alaska State Office
222 West Seventh Avenue, #13
Anchorage, Alaska 99513-7599
http://www.ak.blm.gov


TAKE PRIDE® IN AMERICA

6840(931)

Memorandum

To: Regional Director, Regional 7, U.S. Fish and Wildlife Service

From: State Director, Alaska

Subject: Initiation of Section 7 Consultation for the Northeast National Petroleum Reserve- Alaska Integrated Activity Plan/Environmental Impact Statement Plan Amendment

The United States Department of the Interior (USDOI), Bureau of Land Management (BLM) has initiated the process to amend the 1998 Northeast National Petroleum Reserve-Alaska Integrated Activity Plan/Environmental Impact Statement (IAP/EIS). The BLM is amending this existing plan to consider opening a portion of BLM-administered lands (public lands) that are currently unavailable for oil and gas leasing in the Northeast portion of the National Petroleum Reserve-Alaska (Northeast Planning Area). In addition, the BLM proposes to develop performance-based lease stipulations and Required Operating Procedures (ROPs) in the Northeast Planning Area similar to those stipulations and ROPs included in the Northwest National Petroleum Reserve–Alaska IAP/EIS Record of Decision (Northwest IAP/EIS ROD; USDOI BLM and MMS 2004).

The management plan will fulfill BLM's responsibility for managing lands in the Northeast Planning Area. The plan also fulfills mandates of the President's energy policy to undertake "environmentally responsible oil and gas development in the National Petroleum Reserve-Alaska." In 2002, the President's National Energy Policy Development Group recommended that the President direct the Secretary of the Interior to "consider additional environmentally responsible oil and gas development, based on sound science and the best available technology, through further lease sales in the Petroleum Reserve" and that "such consideration should include areas not currently leased within the northeast corner of the Petroleum Reserve".

Congress first authorized an oil and gas leasing program in the Northeast Planning Area in 1981. The BLM completed an Environmental Assessment (EA) of the Northeast Planning Area in 1981, and an EIS in 1983 (USDOI BLM 1983) that deleted some areas from leasing and recommended stipulations, especially in areas with high surface values. A total of four lease sales were held during 1982 to1985, resulting in the drilling of a single well that was abandoned as a dry hole in 1985.

As a result of renewed interest in the Northeast Planning Area, and the need to update the environmental analysis of potential impacts from oil and gas development, the BLM began an assessment in 1997 of the potential impacts from oil and gas development in the Northeast portion of the Petroleum Reserve, including all lands in the Petroleum Reserve east of the Northwest National Petroleum Reserve-Alaska. The Northeast Plan culminated in a ROD in October 1998 that superseded the decisions of the 1983 EIS and included a decision to make approximately 4 million of the 4.6 million acres available for oil and gas leasing (USDOI BLM and MMS 1998).

Among other decisions, this document made approximately 87 percent of the Northeast Planning Area available for leasing, while approximately 600,000 acres in the Teshekpuk Lake area remained unavailable for leasing and an

approximate additional 240,000 acres were restricted to leasing with no permanent facilities and no exploratory wells. The area that is closed to leasing near Teshekpuk Lake is an area with especially high oil and gas potential. By excluding these areas from future oil and gas leasing, approximately 2 billion of the estimated 3.2 billion barrels of technically recoverable oil in the Northeast Planning Area was made unavailable. The 1998 Northeast IAP/EIS ROD also contained a set of prescriptive-based stipulations to protect natural and cultural resources.

In the five years since the completion of the 1998 Northeast ROD, the BLM has held oil and gas lease sales, leasing 133 tracts in 1999, and leasing an additional 60 tracts in 2002. Many lease tracts were sold around the perimeter of the Teshekpuk Lake area. Since the initial lease sale, industry has completed many miles of seismic lines and drilled 14 exploratory wells. ConocoPhillips Alaska, Incorporated has proposed development of five drilling pads that would be satellites to its Alpine field, near the village of Nuiqsut. Two of the pads would be on public lands within the Northeast Planning Area.

To assess opportunities for oil and gas production on federal lands in the Northwest portion of the National Petroleum Reserve–Alaska (Northwest Planning Area), the BLM began assessing the potential impacts from oil and gas development in the Northwest Planning Area in 2001. The Northwest IAP/EIS was completed in December 2003 (USDOI BLM MMS 2003) and culminated in a ROD in January 2004 that superseded the decisions of the 1983 EIS and included a decision to make 8.8 million acres available for oil and gas leasing. The ROD also contained a set of performance-based stipulations to protect natural and cultural resources in the Northwest Planning Area. These stipulations differ from those developed for the 1998 Northeast IAP/EIS in that they:

1. Do not include actions that already exist in the form of regulation or law;
2. Are reformatted into logical groupings, or Required Operating Procedures; and
3. Provides the BLM and other land users, including industry, greater flexibility by emphasizing the intent or objective of the mitigation to protect the environment.

To carry out its management responsibilities and respond to the Presidential and Congressional directives to the Secretary of the Interior, the BLM is proposing to amend its 1998 Northeast IAP/EIS to:

1. Consider leasing portions of lands currently closed to oil and gas leasing in the Northeast National Petroleum Reserve-Alaska;
2. Develop performance-based measures to protect important surface resources from the impacts of oil and gas activities, similar to those developed for the Northwest National Petroleum Reserve–Alaska.

The BLM is committed to ensuring that ecosystems in all portions National Petroleum Reserve-Alaska remain healthy and productive. The amended plan includes various current and future land based surface-impacting activities that may affect species listed under the Endangered Species Act of 1973, as amended (16 USC 1531 *et seq.*) within the Northeast Planning Area of the Petroleum Reserve. Your staff at the Northern Fish and Wildlife Service Field Office have been consulted informally in regards to Section 7, Endangered Species Act requirements for this plan amendment. This memorandum requests a species list for any listed species in the region. In addition, BLM would like to enter into formal Section 7 consultation for this plan amendment. A biological assessment is currently being prepared and will be submitted in the near future.

If you have any questions, please contact John Payne (907) 271-3431.

Henri R. Bisson
State Director

2 Enclosures
1 - Notice of Intent (2 pp)

2 - General Lease Stipulations and Required Operating Procedures (21 pp)

cc:
Manager, Northern Fish and Wildlife Service Field Office
Project Manager, Northeast Petroleum Reserve-Alaska Plan Amendment

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

June 23, 2004

Henri R. Bisson
State Director
Bureau of Land Management
Alaska State Office
222 West 7th Avenue, #13
Anchorage, Alaska 99513-7599

Dear Mr. Bisson:

We have received your letter concerning amendment of the 1998 Northeast National Petroleum Reserve-Alaska Integrated Activity Plan/Environmental Impact Statement. The Bureau of Land Management (BLM) states this amendment would, among other things, consider leasing portions of lands within the northeastern section of NPRA which are currently closed. The BLM assessment noted that no species currently listed under the Endangered Species Act of 1973, as amended, for which the U.S. Department of Commerce bears responsibility are expected to occur within NPRA. However, the assessment found a possibility for induced effects to the endangered bowhead whale could occur from increased vessel and barge traffic associated with exploration. The BLM determined any such traffic would be minimal, and would have no impact on marine listed species (the bowhead whale). Should any development result from successful exploration, those impacts would be subject to additional analysis under the ESA and the National Environmental Policy Act.

The National Marine Fisheries Service concurs with this conclusion. Therefore your consultation requirements under section 7(a) of the ESA are satisfied, and no further consultation is necessary at this time. We will provide additional comments should future activity move into development phases. Please direct any question to Brad Smith in our Anchorage office at (907) 271-3023.

Sincerely,

Donald J. Berg
For James W. Balsiger
Administrator, Alaska Region

## TABLE OF CONTENTS



### List of Tables



**Note to Reader**: This document contains references to maps, figures, and tables that are part of the *Northeast National Petroleum Reserve – Alaska Final Amended Integrated Activity Plan/Environmental Impact Statement* (Final Amended IAP/EIS). They are referenced in this document, but contain the original numbering scheme used in the Final Amended IAP/EIS.

# APPENDIX D

# BIOLOGICAL ASSESSMENT

## D.1 Introduction and Background

The United States Department of the Interior (USDOI), Bureau of Land Management (BLM) has initiated an amendment to the Northeast National Petroleum Reserve – Alaska Integrated Activity Plan/Environmental Impact Statement (Amended IAP/EIS; amendment). The BLM is amending its 1998 Northeast IAP/EIS to consider opening portions of the BLM-administered lands that are currently unavailable for oil and gas leasing in the Northeast National Petroleum Reserve – Alaska. In addition, the BLM proposes to develop performance-based lease stipulations and Required Operating Procedures (ROPs) for the Northeast National Petroleum Reserve – Alaska (Planning Area), similar to those stipulations and ROPs that were included in the Northwest National Petroleum Reserve – Alaska IAP/EIS Record of Decision (Northwest IAP/EIS ROD; USDOI BLM and MMS 2004).

The Amended IAP/EIS will fulfill the BLM's responsibility for managing lands in the Planning Area. The amendment will also fulfill mandates of the President's energy policy to undertake "environmentally responsible oil and gas development in the National Petroleum Reserve – Alaska." In 2002, the President's National Energy Policy Development Group recommended that the President direct the Secretary of the Interior to "consider additional environmentally responsible oil and gas development, based on sound science and the best available technology, through further lease sales in the National Petroleum Reserve – Alaska" and that "such consideration should include areas not currently leased within the northeast corner of the National Petroleum Reserve – Alaska."

Congress first authorized an oil and gas leasing program in the National Petroleum Reserve – Alaska in 1981. The BLM completed an Environmental Assessment (EA) of the National Petroleum Reserve – Alaska in 1981, and an EIS in 1983 (USDOI BLM 1983) that removed some areas from leasing and recommended stipulations, especially in areas with high surface values. A total of four lease sales were held during 1982 to 1985, resulting in the drilling of a single well that was abandoned as a dry hole in 1985.

As a result of renewed interest in the National Petroleum Reserve – Alaska, and the need to update the environmental analysis of potential impacts from oil and gas development in the National Petroleum Reserve – Alaska, the BLM began an assessment in 1997 of the potential impacts from oil and gas development in the Planning Area, including all lands east of the Northwest National Petroleum Reserve – Alaska. The 1998 Northeast IAP/EIS culminated in a ROD in October 1998 that superseded the decisions of the 1983 EIS and included a decision to make approximately 4 million of the 4.6 million acres available for oil and gas leasing (USDOI BLM and MMS 1998). The 1998 Northeast IAP/EIS ROD also contained a set of prescriptive-based stipulations to protect natural and cultural resources in the Northeast National Petroleum Reserve – Alaska.

Among other decisions, the ROD made approximately 87 percent of the Planning Area available for leasing, while approximately 600,000 acres in the Teshekpuk Lake area remained unavailable for leasing and approximately 240,000 acres were restricted to leasing with no permanent facilities and no exploratory wells. The area near Teshekpuk Lake that is closed to leasing is an area with especially high oil and gas potential. By excluding these areas from future oil and gas leasing, approximately 2 billion of the estimated 3.2 billion barrels of technically recoverable oil in the Planning Area was made unavailable.

In the 6 years since the completion of the 1998 Northeast IAP/EIS ROD, the BLM has held oil and gas lease sales, leasing 133 tracts in 1999, and an additional 60 tracts in 2002. Many lease tracts were sold around the perimeter of the Teshekpuk Lake area. Since the initial lease sale, industry has completed many miles of seismic lines and drilled 14 exploratory wells. ConocoPhillips Alaska, Inc., has proposed development of five drilling pads that

would be satellites to its Alpine field, near the village of Nuiqsut. Two of the pads would be within the Planning Area.

To assess opportunities for oil and gas production on federal lands in the Northwest National Petroleum Reserve – Alaska, the BLM began assessing the potential impacts from oil and gas development in this area in 2001. The Northwest IAP/EIS was completed in December 2003 (USDOI BLM and MMS 2003) and culminated in a ROD in January 2004 that superseded the decisions of the 1983 EIS and included a decision to make 8.8 million acres available for oil and gas leasing. The Northwest ROD also contained a set of performance-based mitigations to protect natural and cultural resources in the Northwest National Petroleum Reserve – Alaska. These mitigations differ from those developed for the 1998 Northeast IAP/EIS in that they:

- Do not include actions that already exist in the form of regulation or law;
- Are modified to reflect an adaptive management concept through the principles of performance-based mitigation measures.

These mitigation measures will provide the BLM and other land users, including industry, greater flexibility by emphasizing the intent or objective of the mitigation to protect the environment.

To carry out its management responsibilities and respond to the Presidential and congressional directives to the Secretary of the Interior, the BLM is proposing to amend its 1998 Northeast IAP/EIS Record of Decision to:

- Consider leasing portions of lands currently closed to oil and gas leasing in the Northeast National Petroleum Reserve – Alaska; and
- Develop performance-based mitigation measures to protect important surface resources from the impacts of oil and gas activities, similar to those developed for the Northwest National Petroleum Reserve – Alaska.

The BLM is committed to ensuring that ecosystems in the National Petroleum Reserve – Alaska remain healthy and productive. The management plan includes various current and future surface-impacting activities that could affect spectacled eiders (*Somateria fischeri*) and Steller's (*Polysticta stelleri*) eiders, species that are federally listed as threatened under the Endangered Species Act (ESA), such as aircraft use, hazardous and solid material removal and remediation, overland moves, seismic activities, and oil and gas leasing, exploration, development, and production activities. Such activities, particularly oil and gas activities, temporary camps, and aircraft traffic associated with wildlife studies and other surveys, could result in disturbance, altered habitat, and spills of oil or other contaminants. These occurrences could adversely affect the behavior, distribution, and abundance of individual eiders or the population occurring in or adjacent to the Planning Area.

This Biological Assessment (BA) is prepared in accordance with Section 7 of the ESA of 1973, as amended (16 USC 1531 et seq.) This document describes 1) the various activities that may occur under the management plan, and proposed oil and gas lease sales, to the standard of a reasonably foreseeable development scenario; 2) the distribution, abundance, and habitat use of listed eiders; 3) the potential impacts of proposed oil and gas leasing as well as exploration, development, and production activities that might occur in the future; 4) the potential impacts of other prescribed activities; and 5) the proposed mitigating measures that could reduce potential adverse effects on listed eiders. The BA covers all anticipated effects of the Amended IAP/EIS on listed eiders. This assessment provides sufficient information on listed eiders and the potential impacts of a reasonably foreseeable development scenario and activities that might occur in the future to support issuance of a Biological Opinion (BO) regarding the reasonable likelihood of the entire action violating Section 7(a)(2) of the ESA, as amended. The U.S. Fish and Wildlife Service (USFWS) previously issued a BO for the Northeast National Petroleum Reserve – Alaska during the 1998 Northeast IAP/EIS. Any BO resulting from the current BA would replace the existing 1998 Northeast IAP/EIS BO.

The analysis incorporates estimates of reasonably foreseeable development scenario for oil and gas development and production impacts on federally-listed eiders thought to be the maximum that could occur (i.e., it attempts to

estimate maximum potential impact to eiders given the entire range of potential impacts). Should commercially producible quantities of oil be discovered and development and production be proposed, additional and subsequent consultation would be conducted to consider the effects these activities. The BLM also would consider the need for further consultation if 1) additional species were added to the list of species designated as threatened or endangered under the ESA, 2) the proposed actions were substantially modified, or 3) significant new effects-related information was developed.

A detailed description of the endangered and threatened species within the Planning Area and effects analyses of similar proposed actions were included in the following previously issued EISs and BOs:

USDOI BLM. 2004a. Alpine Satellite Development Plan Final Environmental Impact Statement, U.S. Department of the Interior, Bureau of Land Management, Anchorage Alaska.

USDOI BLM. 2004b. Alpine Satellite Development Plan Final Biological Assessment, U.S. Department of the Interior, Bureau of Land Management, Anchorage Alaska.

USDOI BLM and MMS. 1998. Northeast National Petroleum Reserve – Alaska Final Integrated Activity Plan/Environmental Impact Statement. BLM/AK/PL-98/016+3130+930. Anchorage, Alaska.

USDOI BLM and MMS. 2003. Northwest National Petroleum Reserve – Alaska Final Integrated Activity Plan/Environmental Impact Statement. BLM/AK/PL-04/02+3130+930. Anchorage, Alaska.

USDOI MMS, Alaska OCS Region. 2003. Beaufort Sea Planning Area Oil and Gas Lease Sales 186, 195, and 202, Final Environmental Impact Statement. OCS EIS/EA MMS 2003-001. Anchorage, Alaska.

USDOI USFWS. 2003. Biological Opinion for the Northwest National Petroleum Reserve – Alaska Integrated Activity Plan/Environmental Impact Statement, May 2003.

USDOI USFWS. 1998. Biological Opinion for the Northeast National Petroleum Reserve – Alaska Integrated Activity Plan/Environmental Impact Statement, March 17, 1998.

This BA references maps (2-4, 3-4, 3-33, and 3-34) and tables (4-4 and 4-5) that are included in the Final Amended IAP/EIS. Section 2.6 (Stipulations and Required Operating Procedures) of the Amended IAP/EIS contains the text for the lease-sale stipulations and ROPs discussed in the BA.

# D.2 Description of Proposed Activities Using the Agency Final Preferred Alternative and Key Assumptions in the Analysis

## D.2.1 Reasonable and Foreseeable Oil Development Scenario and Key Assumptions

The 1998 Northeast IAP/EIS considered two sets of scenarios: the first lease sale scenario and the multiple lease scenarios. Because two lease sales have occurred since the 1998 Northeast IAP/EIS ROD, the scenarios presented in the Amended IAP/EIS and in this BA assume multiple lease sales and full development of the estimated resources within the constraints of the evaluated alternatives.

Under the final Preferred Alternative, all of the Planning Area is available for leasing, except for Teshekpuk Lake (approximately 211,000 acres), which is deferred from leasing. This deferral would also preclude exploratory drilling. An additional 374,000 acres north and east of Teshekpuk Lake would have No Surface Occupancy restrictions. Current leases would not be restricted by the No Surface Occupancy restrictions.

The reasonably foreseeable development scenario is based on a comprehensive geological analysis and computer simulation modeling completed in 2002 by the Minerals Management Service (MMS) and the BLM. In this analysis, the results of petroleum resource characteristics of commercial fields, and of areas where these fields are likely to be discovered and developed were modeled using an average oil price of $30 per barrel. The exact locations for future commercial projects are impossible to define prior to exploration drilling. It is uncertain whether any commercial fields would be discovered, particularly if oil prices were to fall below $20 per barrel for an extended period of time.

### D.2.1.1 Hydrocarbon Potential and Economics

Under the regulatory conditions of the Final Preferred Alternative, it is estimated that up to 12 new fields would be developed as a result of multiple lease sales conducted in the Planning Area. Oil and gas fields on Alaska's North Slope typically are composed of one or more subsurface pools. These pools may, or may not, be grouped so that they can be produced from a common infrastructure. The first fields developed would be oil fields. Currently, no infrastructure exists to transport natural gas from the North Slope to a market. While natural gas is a byproduct of oil development, the BLM does not consider natural gas production to be reasonably foreseeable.

Assuming $30-per-barrel oil, 1,727 million barrels of oil could be developed in the Planning Area. Analyses of the geologic plays indicate commercial fields are most likely to be discovered in the portion of the Planning Area designated the "High Potential" area (i.e., the area having the highest economic potential for oil development, based on $30-per-barrel oil; Map 3-4). This High Potential area includes the area surrounding Teshekpuk Lake and the coastal areas to the north of the lake.

In previous oil leases, larger fields typically have been found earlier in the exploration cycle, and are more likely to be economically viable. This reasonable and foreseeable scenario assumes that the first fields developed in the Planning Area would be approximately the size of the Alpine field in extent of gravel cover, petroleum resources, associated activity, and current technology. The following hypothetical discovery and related reasonably foreseeable development and production schedule is the BLM's estimate of the types and timing of activities that could occur as a result of multiple lease sales under the final Preferred Alternative.

This analysis is based on two distinct, but related, phases in the discovery and development of an oil field on the North Slope of Alaska. In the first phase a lease sale is held, followed by the successful lessee entering into an exploration program. The second phase is success in discovery, followed by the construction of production facilities, operation and, in approximately 30 years, abandonment of the sites.

### D.2.1.2 Key Assumptions for Analysis

Key assumptions for this BA ensure that the analysis is conservative with respect to the listed eider species. The following reasonably foreseeable scenario assumes that all of the projected development under the Final Preferred Alternative would occur in the area of high potential for oil and gas development (Map 3-4).

Beginning in 1986, extensive aerial waterfowl breeding population surveys (referred to as breeding pair surveys) have been conducted by the USFWS on the Arctic Coastal Plain (ACP) of Alaska. These surveys have provided population estimates for many species of breeding waterfowl throughout the ACP (Mallek et al. 2003). The timing of this breeding pair survey, however, is too late to accurately assess eider populations, as male eiders begin leaving the ACP in mid- to late June (before the start of the aerial breeding pair survey; Larned et al. 2003). In 1992, a second survey (referred to as the eider population survey) was begun in order to collect information at a more phenologically appropriate time for the detection of male eiders. This eider population survey has been conducted annually since 1992, and has provided data to develop a population index and distributional information for several species, including spectacled eiders. Given that Steller's eiders are present on the ACP in very low densities, the eider population survey's sampling intensity is inadequate for obtaining data to develop a population index for this species. Quakenbush et al. (2002) has suggested that the range of the Steller's eider in Alaska has been greatly reduced, mostly in the vicinity of Barrow. In 1999, a survey specifically designed to obtain

information on Steller's eiders in the Barrow area was initiated (Ritchie and King 2002, 2003). The survey area, which is referred to as the "Barrow Triangle," encompasses a 1,064-$mi^2$ (2,757-$km^2$) area south of Barrow and west of Admiralty Bay (see Ritchie and King [2004] for a complete description of the study area and slight differences among years). This survey has provided densities and population estimates of Steller's eiders in the Barrow area for the past 5 years.

The spectacled eider density used for this analysis was derived from population survey data collected between 1992 and 2002 (Larned et al. 2003). As some high density areas have been found in the Planning Area, the BLM chose the high end of the range of spectacled eider densities found on the eider population survey, or 2.85 observed birds per $mi^2$ (1.10 observed birds per $km^2$; Bob Platte, USFWS, pers. Comm.), as the basis for this analysis. A visibility correction factor has not been applied to this density estimate.

In order to be as conservative with respect to Steller's eiders, the BLM chose to use densities generated by the "Barrow Triangle" survey, as they are likely to be the greatest densities of Steller's eiders present on the ACP. For this analysis, the BLM used a mid-level Steller's eider density of 0.16 observed birds per $mi^2$ (0.06 observed birds per $km^2$; Ritchie and King 2002, 2003), since high densities of Steller's eiders have not been found anywhere in the Planning Area. A visibility correction factor has not been applied to this density estimate.

The selected densities are intended to represent the high end of a reasonable range, in recognition of the uncertainties about the future location of facilities, as well as imprecise information on eider distribution. Use of these density figures would likely result in the overestimation of potential impacts to listed eiders, thus ensuring that if development were to occur elsewhere in the Planning Area, the effects generally would be equal to or less than those noted in this BA. However, the assumed densities do not compensate for the bias inherent in estimating bird densities from aerial surveys. An established/accepted visibility correction factor is not currently available to apply to eiders detected on the aerial surveys. A visibility correction factor would allow the numbers of individuals observed from the air to be converted to a more accurate representation of the actual number of birds present by compensating for those birds not detected from the aircraft. In the absence of such a correction factor, the BLM assumes that the aerial survey data used for this BA may underestimate both populations and densities of listed eiders within the Planning Area.

To address disturbance effects to eiders, in addition to the immediate habitat loss from gravel pad and road development, the BLM is assuming both a 656-foot (200-meter) and a 1,640-foot (500-meter) zone of influence occur around all gravel production and development pads and roads. The 656-foot (200-meter) zone of influence has been used in previous analysis by USFWS, but is based on best professional judgment and little empirical data supports its use. The additional 1,640-foot (500-meter) zone of influence will allow for a determination of the maximum number of eiders that potentially could be affected by production facilities.

Development assumes 48 exploration wells and 35 delineation wells would be drilled using four exploration drill rigs. Exploration and delineation drilling would occur during winter months. Previous experience, in an unproven, high-cost, frontier area, has shown that this many exploration wells typically are required to discover an estimated 12 economically developable fields. Delineation and appraisal exploration would require three winter seasons to determine the extent of each field. While exploration activities primarily would be a winter exercise, "cold stacking," or the storage of exploration equipment, would occur at designated sites that would be accessible by helicopter or fixed-wing aircraft during the summer season to allow for occasional routine inspections.

For analysis, it is assumed development would include two larger fields that would serve as Central Production Facilities (CPFs) that are Alpine field-like in design, each with five satellite fields connected to each CPF, for a total of 12 fields. The CPFs are stand-alone facilities, with processing equipment for separating oil and gas, handling waste, and transporting oil through pipelines to large-scale distribution systems. Satellite developments involve fields too small to support full-scale operations and must rely on CPF facilities to separate the oil and gas, waste handling, and the transport of oil to large-scale distribution systems. Each Alpine field-like CPF would consist of both a production and a processing facility, with a second production-only pad in the near vicinity ($\leq 3$ miles), an airstrip, and a connecting road when a second production pad is part of the CPF. Current technology and

economic considerations limit satellite fields to a maximum of 20 miles from a CPF. Current technology allows for "roadless" facilities, which means that roads could exist within and between the satellite and CPFs, but no roads would connect the CPFs to each other, and no "feeder" roads would connect to existing infrastructure in the Alpine field or to either of the CPFs. Geologic information, economics of extraction, and proximity to existing infrastructure in the Colville River Delta suggest this reasonably foreseeable development would take place within the area of high economic oil and gas potential. Within the Planning Area, the highest potential for success is in the northern portion of the Planning Area (Map 3-4). None of these facilities would require the establishment of new landfill locations. The approved landfill currently in operation at Deadhorse most likely would be used for materials not requiring additional treatment. Organic wastes would be disposed of in accordance with the Clean Water and Clean Air acts, and the disposal of any liquid or solid waste would not be permitted on site (ROP A-2).

## D.2.2 Phase I: Leasing and Exploration

Exploration is on-going in the Planning Area. This document assumes that there would be multiple lease sales in the future, with the first lease sale under the amended IAP/EIS occurring in mid-2005 and leases issued later that year. Exploration actions would begin the following winter season. Other lease sales would be conducted at 2- to 3-year intervals thereafter.

### D.2.2.1 Seismic Activities for Exploration

Most seismic surveying occurs during the winter months. Typically, three to four seismic crews are active on the North Slope each winter. It is expected that, on average, one to three 2-D seismic surveys would occur during the next 25 years. Additional 3-D seismic surveys would take place about two to three times during that period. Seismic crews are housed in mobile camps consisting of a "cat train" of trailer sleds pulled by tractors. Winter seismic operations are conducted by all-terrain ground vehicles and supported by light aircraft. Current seismic technology uses vibrator equipment (Vibroseis and airguns) to generate energy into the subsurface. A limited amount of support by aircraft (fixed-wing and helicopter) would be needed to survey potential sites during summer months to prepare for winter survey activities.

The only activities associated with these winter seismic surveys that would occur during the summer would be annual maintenance. Following the end of each winter seismic season, each crew stores its equipment at a staging area, which is usually an existing gravel pad built previously for some other purpose (e.g., during previous exploration in the Northeast National Petroleum Reserve – Alaska, seismic equipment was stored in the summer of 2003 at Lonely and Inigok, both previous development areas). Sometime during the summer, a repair crew would spend 2 to 4 weeks performing annual maintenance and installing upgrades to the seismic equipment. These activities would require aircraft support, with one to two fixed-wing and two to three helicopter flights per week. On completion of the maintenance work, the crew would leave the equipment cold stacked, and there would be no activity until the following winter. For analysis purposes, it is assumed that maintenance operations would be self contained and use accommodations that are part of the seismic camp. On completion of the work, all wastes would be removed and disposed of at approved disposal sites on the North Slope. None of these activities would require the establishment of new landfill locations. The approved landfill currently in operation at Deadhorse most likely would be used for materials not requiring additional treatment. Organic wastes would be disposed of in accordance with the Clean Water and Clean Air acts, and disposal of liquid or solid waste would not be permitted on site (ROP A-2).

Teshekpuk Lake is in the high potential area for oil and could be the subject of future exploration including the conduct of seismic surveys. Previous seismic surveys have been conducted in the lake and are not specifically prohibited under the final Preferred Alternative. The lake has large areas that are too deep to freeze from the lake surface to the lake bottom. Vibroseis surveys do not provide good data when conducted on ice that is not bottom-founded. It is therefore likely that any seismic surveys conducted in the lake (at least in the deep portions) in the future would be carried out during the ice-free period using an array of airguns as the sound source that would be towed behind a vessel. This type of surveying could potentially be conducted in other large lakes or in coastal

waters such as the Kogru Inlet. In coastal areas, larger boats may be utilized and the crew could be housed on the vessel. In inland areas, such as Teshekpuk Lake, the seismic crew would likely be housed in temporary field camps or shuttled each day by aircraft to and from existing facilities.

#### D.2.2.2 Exploration Drilling

There would be a maximum of four exploration drill rigs operating in the Planning Area during any one year. Drilling depths for exploration and delineation wells average 10,000 feet, but would likely range from 6,000 to 12,000 feet. Onshore drilling would be conducted entirely during the winter months (early December to mid-April). A typical exploratory well (10,000 feet) could use about 630 short tons of drilling mud and produce about 820 short tons of dry-rock cuttings. Upon completion of drilling operations, all equipment and materials would be removed (during winter operations) over ice roads to staging areas and then to other locations on the North Slope, or to recycling centers out of the country. Due to the expense of constructing new staging areas, it is thought that previously-occupied sites such as Camp Lonely, Inigok, and Umiat would likely be the sites for such staging for exploration and production. Drilling material (mud and cuttings) could be re-injected into the dry drill hole if the exploration well was unsuccessful. If drilling was successful, the well would be temporarily capped, and the operator would remove drilling materials (mud and cuttings) and other camp wastes to an approved disposal area off site in accordance with the Clean Water and Clean Air acts. No liquid or solid waste would be disposed of on site, but would be removed from the staging area and disposed of at an approved site.

The final Preferred Alternative provides an opportunity to lease in the immediate offshore area of the Planning Area, which includes Kogru Inlet. Exploration drilling could potentially occur in these areas during the ice-free period from temporary platforms or vessels, such as barges or mobile drilling rigs. Drilling equipment could be transported by vessel to coastal area or by helicopter or ice road (from staging areas) to inland areas.

#### D.2.2.3 Winter Transportation and Support Infrastructure for Exploration

Ice roads would provide seasonal routes supporting winter activities. These temporary roads are constructed by spreading water from local sources (rivers and lakes) to build up a rigid base (Stipulation B-1). New construction methods, such as the use of aggregate chips produced from frozen lakes, significantly decrease both water demands and construction time for ice roads. Low-pressure vehicles are used to establish ice roads, which can then be used by conventional vehicles. Ice roads are designed to be a minimum of 6 inches thick, 30 to 35 feet wide, and up to 50 miles long. Ice roads would connect each exploration drill site to the staging area during winter activities.

Ice pads are used commonly as platforms for winter exploration activities (e.g., Northeast National Petroleum Reserve – Alaska exploration, 1999-2003). The method used to construct ice pads is similar to that described for ice roads. The tundra surface is flooded with water to build up progressive layers of ice, although the use of aggregate chips speeds up the process while decreasing water use. A typical ice pad is designed to be a minimum of 1-foot thick, covers 6 acres, and requires approximately 500,000 gallons of water to construct. Depending on the location of exploratory wells, ice pads range in size from 3 to 10 acres. Current ice-pad design technology could allow some pads to remain intact over the summer season. During the summer season, these ice pads would house one exploration drill rig. Each of these rigs would be stored with towers or derricks folded, and would present a silhouette of approximately 20 feet in height.

As many as half of the ice pads could be multi-year pads used for summer activities, such as storage of equipment. Tundra habitat under the footprint of multi-years pads would be lost as spectacled and Steller's eider habitat during the lifetime of the pad. Vegetation under the footprint of multi-year pads would be relatively unaffected after the pad melted (McKendrick 2000). Some vegetation within a 3- to 6-foot (1- to 2-meter) wide band around the perimeter of multi-year ice pads could be damaged and require several years to recover. Under the maximum development scenario, 50 multi-year ice pads and 50 single-season ice pads covering 6 acres each could be constructed, resulting in a total footprint of 600 acres during the life of the project.

Materials and equipment necessary to support winter exploration activities could be moved to staging areas within the Planning Area by marine transport in the summer months (late July/August), and then overland on ice roads or hardened snow trails during winter exploration activities. The sealifts for exploration would use two to seven barges per year. The majority of large equipment movement would be by sealift to staging areas at locations such as Camp Lonely during summer months, then to the exploration pads over ice roads during winter months. These exploration staging areas would be small (500 feet by 500 feet gravel or sand-gravel pads), with summer activity limited to offloading and storage. When possible, existing pads would be used, although new pads could be constructed to support winter exploration activities.

Exploration activities, such as seismic surveys and drilling, could also occur during the ice-free period in coastal areas, such as Kogru Inlet and on large lakes such as Teshekpuk Lake. Equipment to be used for these activities could be transported directly to the site by vessel in the coastal areas, flown in via helicopter, or transported to coastal staging areas and then transported to the site during winter via ice roads.

While this scenario assumes that Barrow could be used as a staging area for the western portion of the Planning Area, the BLM does not anticipate development projects in direct support of exploration activities to be located at or near that community. Barrow already is a regional hub for commerce on the western North Slope, with an established airport and other support facilities that can accommodate most large planes currently used to support the oil and gas industry in Alaska. Infrastructure currently exists in Barrow to handle sealifts during the summer months and air freight during winter months that routinely supply the community.

There would be some additional employment and investment in the community during the exploration and construction phases, but the level of additional employment would be small and short term. The majority of support for exploration is expected to be deployed from Deadhorse because of its proximity to the Dalton Highway (Haul Road) and its existing oil field contractor-support facilities and infrastructure.

## D.2.3 Phase II: Development, Production, and Abandonment

If exploration activities were successful and an economically viable field was discovered, companies likely would move forward to development and production. The first steps in these processes are to gather information and data, and to design and permit the project. All development projects would go through a National Environmental Policy Act evaluation and would require consultation with the USFWS pertaining to any species listed under the ESA. If ice roads or pads were needed during the production and abandonment phase, these activities would be essentially the same as those described in D.2.2.3 (Winter Transportation and Support Infrastructure for Exploration).

### D.2.3.1 Field Development

Analysis of hydrocarbon potential and economics (Section 4.2.1.2, Table 4-4 of the Final Amended IAP/EIS) indicates that up to 12 fields would be developed in the high price ($30 per barrel) scenario. These fields would be a mixture of large fields (CPFs similar to the Alpine field) and smaller satellite fields. It is assumed that two Alpine-size fields, or CPFs, would be discovered and developed in the Planning Area, with five additional satellite fields tied into the infrastructure of each of the CPFs. A reasonable and foreseeable scenario suggests that each satellite field would be connected to a CPF by a gravel road. Current pipeline engineering constraints dictate that satellite fields are located within 20 miles of a CPF. Discovered fields that do not have enough oil to be economically developed, or are too far away from a CPF using today's technology, would not be developed and would have no pads. For this impact analysis, we have assumed an average distance of 10 miles from each satellite facility to its associated CPF. None of these facilities would require a new landfill location. Organic wastes would be disposed of in accordance with the Clean Water and Clean Air acts. No liquid or solid waste would be disposed of on site.

Under the final Preferred Alternative, it is assumed that one of the CPFs would consist of two gravel pads covering a total of 66 acres, a 5,000-foot airstrip covering 11 acres, and a 3-mile connecting road (connecting the two pads),

which, at approximately 7.5 acres per mile, would cover 23 acres for a total of approximately 100 acres. The other CPF would consist of one large production and processing pad (approximately 50 acres) and a 5,000 foot airstrip covering approximately 11 acres. Runways would be oriented in a west-southwest/east-northeast direction, similar to the Barrow Airport.

A typical satellite field would be developed from a single gravel pad with a footprint of approximately 10 acres. Each pad would hold approximately 20 to 30 wells and would be accessed from the anchor development on a permanent gravel road approximately 62 feet wide at the base and up to 20 miles (average 10 miles) in length. Five satellite fields would be developed for each CPF. However, satellite field development would not be expected to occur until several years after the CPF was developed (this is true of the Alpine field development), and would have a production life of approximately 10 years. One 11-acre airstrip is assumed per group of five satellites.

Total areas of the gravel footprints for all of the above potential developments, as well as for two scenarios for summertime "zones of influence" (i.e., zones of potential disturbance to eiders) around the gravel pads are presented below in Table D-1.

There would be a maximum of eight development rigs operating in any given year. The time required to drill and complete a production well depends largely on the measured depth of the well. Currently on the North Slope, it takes approximately 20 to 30 days to drill and complete a 10,000-foot well. This equates to approximately 12 to 18 wells per rig over a 12-month period. Safety considerations normally restrict operations to one rig drilling on each pad at a time. Using the above example, in which up to 30 wells from each pad would be needed for initial reservoir development, drilling operations would take 3 to 4 years to complete. The overall development phase from construction of a staging area and remote base camp to production startup could take up to 3 to 4 years, depending on the size and location of the new field.

**Table D-1. Gravel Footprint and Zones of Influence for Production and Related Facilities.**

| Activity | Gravel Footprint in Acres ($km^2$)[1] | 200-Meter Zone of Influence in Acres ($km^2$)[2] | 500-Meter Zone of Influence in Acres ($km^2$)[3] |
|---|---|---|---|
| CPF developments (2) | 161 (0.7) | 1,252 (5.1) | 4,019 (16.3) |
| Satellite developments (10) | 872 (3.5) | 17,436 (70.6) | 46,803 (189.4) |
| Gravel extraction sites (6 at 20-50 acres each) | 225 (0.9) | Not Applicable | Not Applicable |
| Staging areas (2) | 100 (0.4) | 257 (1.0) | 939 (3.8) |
| Total area | 1,356 (5.5) | 18,945 (76.7) | 51,761 (209.5) |

[1] Includes only the area under the gravel.
[2] Includes only the area outside the gravel but within 200 m of the gravel.
[3] Includes only the area outside the gravel but within 500 m of the gravel.

The description of exploration activities in Section D.2.2.3 (Winter Transportation and Support Infrastructure for Exploration) for staging areas and sealifts is also applicable during the development phase, with respect to the timing and types of activities. During development, the staging area(s) could be larger, up to 50 acres. Development of the staging area would occur in winter prior to the start of development activities. Where practical, staging areas used for exploration would be used for development. The number of barges required in each sealift to support development activities would be greater than the number required for exploration activities. However, the modules and equipment still would be offloaded from barges in 3 to 5 days and stored on the staging area pad until winter, when they would be transported by ice road to the CPF development site. The individual modules could be 20 to 30 feet in height. After transportation to the CPF development sites, these modules would become the site's operation and housing facilities complex. There likely would be two large sealifts (1 year apart) for each CPF.

### Drill-Pad and Road Construction

Construction of gravel pads, roads, airstrips, and staging areas would be some of the first development activities to take place. Current technology uses gravel pads to support both CPFs and satellite production facilities. Gravel requirements for current "all-gravel" pads raised 5 feet or more above a wet tundra surface are approximately 8,000 to 12,000 cubic yards per acre of surface footprint. Gravel roads (approximately 62 feet at the base) cover approximately 7.5 acres per mile, and require 40,000 to 60,000 cubic yards of gravel per mile. Airstrips (100 feet wide and 5,000 feet long), cover 10 acres and require 110,000 cubic yards of gravel. The total gravel estimate for 12 fields, consisting of two CPFs and 10 satellite pads, is approximately 6,823,000 cubic yards. Any staging area or pump station sites would have gravel requirements. A staging area (50 acres) would require an additional 900,000 cubic yards of gravel.

Gravel mining and transportation would occur during the winter months, when gravel can be moved by heavy equipment over ice roads. Where gravel extraction has occurred on the North Slope, sites are 20 to 50 acres in size. Two CPF development sites and 10 satellite pads with roads would require approximately six extraction sites averaging 35 acres in size to be developed. The location of these potential mine sites are unknown at this time. If larger gravel extraction sites were discovered, the extraction footprint per site could exceed 50 acres in size, but the number of sites would be reduced, and the total disturbance footprint also would be less. Gravel extraction sites necessarily would be located within the area of highest geological potential because of the high cost of material transport.

### Development of Production Pad and Facility

The first production pad (anchor pad) would be constructed approximately 8 years after the lease sale. Up to 489 production and injection wells would be drilled in total for the 12 fields. Each field would likely take 3 to 4 years for the drilling of associated production and service wells. The wells would be drilled year-round from the gravel pads. A maximum of eight drill rigs would be used to drill wells in all fields during a given year.

### Central Production Facility

The CPF serves as the operational center for long-term production activities in an oil field. In addition to oil-production equipment, the CPF typically includes living quarters, offices, maintenance shops, storage tanks for fuel and water, power generators, waste-treatment units, and a communications center. For most North Slope projects, many components of the CPF are constructed as transportable modules in offsite locations, normally outside Alaska, and then moved to staging areas in the summer by sealift. The following winter they are moved overland on ice roads to the field and assembled. All buildings are supported on pilings to accommodate ground settling or frost heaving. An airstrip usually is located near the CPF to allow transport of supplies and personnel to the field site.

Power, telephone, and other communication lines would be buried in the roads or installed on the pipeline vertical support members (VSMs), to the extent practicable. Each CPF would have one tall (up to 60 feet) communication tower. Required Operating Procedure E-14 (see Section 2.6; Stipulations and Required Operating Procedures) would require that the tower guy wires be marked, increasing visibility to reduce potential collision by listed eiders.

Oil production equipment would include three-phase separators (oil, gas, and water are produced in varying proportions from each well); gas conditioning (natural gas liquids are stripped from produced gas); complex pipeline gathering and pressure regulation systems; and well monitoring and control systems. Oil from production wells would be filtered (to remove sand) and processed (removing water and gas) before being piped through a sales meter and into the sales-oil pipeline system. Gas would be processed (to remove liquids), pressurized (compressed), and re-injected into the reservoir through service wells. Likewise, water would be processed (chemically treated) and then re-injected into the reservoir for pressure maintenance. Re-injection of produced gas and water would increase oil recovery; this practice is normally initiated from the onset of production.

### Pipeline Infrastructure

The actual locations of new pipelines constructed in the Planning Area would depend on both the location and sequence of discoveries of commercial-sized oil fields. Fields developed early would establish the first pipeline corridors connecting the Planning Area production to existing infrastructure at the Alpine field. Fields discovered and developed later would attempt to use these existing pipelines, if the capacity was available. If large fields were discovered late in the exploration sequence, they could require their own oil pipelines. It is possible that commercial-sized fields discovered by different companies would be shut in (not produced) until an agreement was reached to share the costs of constructing a large main line from the Planning Area to common carrier pipelines that connect to the Trans-Alaska Pipeline System (TAPS). In this analysis, one connecting pipeline would be constructed to the existing Alpine field facility, which has infrastructure available to connect to TAPS.

The scenario developed for the final Preferred Alternative assumes that 205 miles of pipeline would be installed during the winter, coinciding with the construction of the development and production facilities. The pipeline would consist of approximately 97 miles of elevated field gathering lines for oil and 108 miles of elevated oil trunk lines. The gathering pipeline would consist of connecting multiphase pipelines (a 24-inch oil pipeline, a 14-inch water pipeline, and a 10-inch gas pipeline for gas reinjection) installed aboveground on VSMs, and would be placed a minimum of 7 feet above the tundra. The VSMs would be spaced 55 to 70 feet apart. Routine pipeline maintenance would occur during the winter months, with summer activities occurring on an emergency basis only.

Possible future pipeline corridors in the Planning Area are speculative, but routes would be based on several factors, including oil-resource potential, previous leasing, and previous discoveries. The actual location of undiscovered, commercial-size fields and the timing of discovery are impossible to predict. For analysis purposes, 225 miles of common carrier trunk line would be constructed in the Planning Area, with an additional 120 miles constructed on State of Alaska lands to the east to transport product to market.

None of the pipelines described above would be established as subsea infrastructure.

### Aircraft Support During Development

The highest level of aircraft activity would occur during the period when both construction and development drilling are occurring. From June 1, 2001 to July 15, 2002, there were a total of 1,474 aircraft landings or take-offs (a daily average of 32.8 operations) at the Alpine field (ABR Inc. 2001; Johnson et al. 2003a). About half of the aircraft operations were helicopter flights. The next largest group was primarily passenger planes (CASA, Twin Otter, Navajo, and Beech), averaging seven flights per day. On average, there was one DC-6 round trip flight per day. We expect similar levels of aircraft activity during the summer development phases for each of the CPF developments.

#### *Estimated Number of Flights*

The total number of flights expected to occur on the Planning Area over the life of the project is estimated below in Table D-2. The *Alpine Satellite Development Plan EIS* (USDOI BLM 2004a) provided estimates of the aircraft flights that might be generated by construction, development, and operation of the Alpine field, and these estimates were used as a baseline in the development of estimates for vehicular traffic that might occur in the Planning Area under the proposed development scenario as the proposed development consists of two Alpine field-like developments. The estimates shown in Table D-2 allow for other unscheduled flights, and project-related research.

Aircraft flights that occur during winter months would have no effect on eiders as they are not on the North Slope at that time of year. Therefore predicted winter (October-May) aircraft flights were not included in the estimate. Exploration occurs during the winter; however, some flights are conducted during the summer in support of seismic equipment maintenance operations. Development and operation would require aircraft support. Construction of the facilities (gravel pads, pipelines, buildings, etc.) would result in the most traffic.

**Table D-2. Predicted Number of One-way Aircraft Flights Annually in the Planning Area during June through September.**

| Activity | Number of Flights Each /Summer[1] | Number of Months[2] | Number of Years | Total Summer Flights |
|---|---|---|---|---|
| Exploration | 40 | 1 | 10 | 400 |
| Construction | 8,160 | 4 | 2-4 | 32,640 |
| Operation | 3,882 | 4 | 30 | 116,460 |
| Abandonment | 19 | 4 | 5 | 96 |
| Non-Operational | 2,500 | 4 | 30 | 75,000 |
| Total | | | | 224,596 |

[1]If all phases of all activities envisioned in the development scenario occurred concurrently.
[2]Summer exploration flights are for maintenance of exploration equipment.

Summer aircraft flights were estimated based on the following information and assumptions:

- Construction flight numbers for the CPFs are estimated from the average number of flights recorded/day from June through August during the major construction period at the Alpine field facility, CD-1 and CD-2 (1999-2001; flight numbers reported in Johnson et al. 2003).
- Construction and operational flight numbers for the satellite developments are estimated from information on estimated flights contained in the *Alpine Satellite Development Plan Final EIS* and Biological Assessment (USDOI BLM 2004a, 2004b).
- Operational flight numbers for the CPFs are estimated from flight information for the Alpine field air strip from May through August of 2004 (ConocoPhillips Alaska, Inc. pers. comm.).
- The development scenario for the final Preferred Alternative assumes 2 Alpine-like CPFs and 10 satellite pads, therefore estimates from the *Alpine Satellite Development Final EIS* were multiplied by 2.
- Aircraft flights that occur during the winter months would have no effect on eiders as they are not on the North Slope at that time of year. Therefore, predicted winter (October-May) aircraft flights were not included in the estimate. Exploration occurs during the winter; however, some flights are conducted during the summer in support of seismic equipment maintenance operations. Development and operation would require aircraft support. Construction of the facilities (gravel pads, pipelines, buildings, etc.) would result in the most traffic.
- A flight equals a take-off or landing in a 24-hour period (i.e., all flights are one way).
- The estimation presented here assumes a linear progression from exploration through abandonment occurring concurrently, with exploration lasting 10 years, construction of CPFs lasting 4 years, individual satellites lasting 2 years, development lasting 30 years, and abandonment lasting 5 years. Actual timelines would likely be different and influenced by what is discovered, when it's found, economics, technology, and development permit requirements. Overlaps between phases should be expected. Therefore, any estimation of flights/month or year is likely an under-or over-estimation.
- Non-operation flight numbers from the *Alpine Satellite Development Plan EIS* (2,500 one-way/year) are included in the estimate for the 30-year operation period. This is likely an overestimation, as the majority of these flights are believed to be related to surveys required for development of the Alpine satellite fields. These surveys would be required for any development, but would likely only last for 3 to 5 years for any particular action. Additional flights may be required, based on monitoring requirements that could last for the life of the project, but this number is likely to be less than required pre-construction.

- The estimated flight numbers are based on current information. Actual flight numbers would be dependent on the level and timing of exploration, development, and production; limitations imposed by natural resource and subsistence protective measures; and future technology.

### Traffic

The construction and use of ice roads and gravel roads as proposed under the development scenario considered in this BA would generate a significant number of vehicle trips, with potential for eider disturbance or collision. The *Alpine Satellite Development Plan Final EIS* (USDOI BLM 2004a) provided estimates of the vehicular traffic that might be generated by construction, development, and operation of the Alpine field, and these estimates were used as a baseline in the development of estimates for vehicular traffic that might occur in the Planning Area under the proposed development scenario. The proposed development consists of two Alpine-like developments.

Vehicular traffic that takes place during winter months would have no effect on eiders, as they are not on the North Slope at that time of year. Therefore, predicted winter (October-May) traffic on gravel roads, and all predicted traffic on ice roads, were not included in the estimate. Exploration would result in no significant vehicular traffic. Development and operation would result in limited vehicular traffic. Construction of the facilities (gravel pads, pipelines, buildings, etc.) would result in the most traffic. Estimates of the annual and total number of vehicle trips are provided in Table D-3.

**Table D-3. Predicted Number of Vehicle Trips and Miles That May be Driven Monthly in the Planning Area during June through September and Over the Life of the Project.**

| | Trips/Month[1] | | Miles/Month[2] | | Total Trips[3] | | Total Miles[4] | |
|---|---|---|---|---|---|---|---|---|
| | **Mean** | **Maximum** | **Mean** | **Maximum** | **Mean** | **Maximum** | **Mean** | **Maximum** |
| Exploration | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Construction | 740 to 6,600 | 2,300 to 6,700 | 14,800 to 132,000 | 46,000 to 134,000 | 192,384 | 222,720 | 3,847,680 | 4,454.400 |
| Drilling | 420 to 840 | 450 to 900 | 8,400 to 16,800 | 9,000 to 18,000 | 28,224 | 30,240 | 564,480 | 604,800 |
| Operations | 90 | 120 | 1,800 | 2,400 | 21,600 | 28,800 | 432,000 | 576,000 |
| **Total** | | | | | 242,208 | 281,760 | 4,844,160 | 5,635,200 |

[1] Number of round trips per month in the Planning Area based on projected mean and maximum numbers of trips for Alternative F in the Alpine Satellite Development Plan Final EIS (USDOI BLM 2004a) Alternative F. Assumed that no more than five satellites would be developed at a time and therefore used the numbers provided in that document.
[2] Number of months traffic occurs during any year when eiders are present (June-September).
[3] Total number of miles driven per month, based on mean and maximum numbers of trips per month with an average of 20 miles per trip.
[4] Total number of round trips driven over the lifetime of the project month based on projected trips for Alpine Satellite Development Plan Final EIS (USDOI BLM 2004a). Alternative F times 2.4 as the final Proposed Action entails 12 fields while the Alpine Satellite Development Plan Final EIS entailed only 5 fields. Life of project consisted of construction, drilling, and 20 years of operations.
[5] Total number of miles driven over the life of the project based on the mean and maximum number of trips to be driven and an average of 20 miles per trip.

## D.2.3.2 Offshore Development Related to the Planning Area

The final Preferred Alternative would provide an opportunity to lease in the immediate offshore area of the Planning Area, including Kogru Inlet. The shorelines are protected by a ¾-mile No-Surface Occupancy (Map 2-2) requirement, both offshore and onshore, to protect the nearshore habitats. Reasonably foreseeable projections do not anticipate production facilities offshore. If a commercially viable discovery were made in the offshore area it most likely would be reached using directional drilling techniques anchored onshore, and a new analysis would be prepared to address the specific issues related to offshore production. If development occurred offshore, it likely

would be constructed using materials and techniques similar to those used at the island bearing the Northstar development (U.S. Army Corps of Engineers 1999).

## D.2.4 Production

The field infrastructure would include processing facilities and a permanent airstrip, and would operate year-round for at least 20 years. The first production from new leases could start up in 2018, with estimated peak rates of 77 million barrels per year (211,000 barrels per day).

### D.2.4.1 Production Activities

During production, the size of the gravel footprint would remain constant. There would be higher levels of human activity at the two CPF development sites than at the satellite, or secondary fields. The number of aircraft flights to support the facility is estimated at four propeller-driven passenger planes (CASA, Twin Otter, Navajo, Beech) and 5 to 10 to ten helicopter flights per week. There would be some truck traffic from the main facilities to satellite and secondary pads on a daily basis. There would be helicopter flights along the length of the pipeline to monitor its integrity on a monthly basis, at a minimum.

The pipelines would be pigged and electronically monitored to determine pipeline integrity. Pipeline maintenance would be planned, and would occur during the winter months when the pipeline could be readily accessed by ice road or hardened snow trail.

Wastes generated at the production facility would be incinerated at the facility or treated and transported to approved disposal sites on the North Slope.

### D.2.4.2 Watercraft Support to Production Facilities

It is likely that facilities would be supplied by annual sealift. Most of these supplies would arrive in containers by barge in late July or August. Containers would be offloaded with cranes and stacked on the gravel pad at the staging area. The typical container would be less than 10 feet in height. Vessel traffic generally would be limited to routes in shallow, nearshore waters between staging areas connected to existing infrastructure (e.g., West Dock, or Oliktok Point) and staging areas along the coastline in the Planning Area at potential sites such as Camp Lonely.

Non-recreational airboat use is allowed on streams, lakes, and estuaries seasonally accessible by motorboats. Airboats would be prohibited in seasonally-flooded tundra and shallow waters with wetland vegetation adjacent to streams, lakes, and estuaries. For this analysis, it is assumed that no facilities would be constructed adjacent to waterways that could support non-recreational use of watercraft, because of the setbacks required by stipulations K-1, K-2, and K-3.

### D.2.4.3 Public Access and Subsistence Activities

The developments would not be accessible to the general public for recreational or tourism activities. However, the areas would be available to rural subsistence users. Subsistence use of the Planning Area is variable based on the availability and location of subsistence species. It is possible that subsistence activities could be enhanced by the road infrastructure described in this reasonably foreseeable scenario.

### D.2.4.4 Spill-Response Training and Research Activities

There likely would be annual summer oil-spill-response training, which could involve 20 to 40 individuals for 1 to 2 days each summer at each CPF. There would likely be an increase in aircraft landings and take-offs, and if the facility were near water, there likely would be an increase in watercraft activity.

Boats and other watercraft could be used by researchers during study efforts if facilities, or areas of concern, were located near large waterbodies such as the Beaufort Sea, rivers, or large, deepwater lakes. These activities would occur during the summer months, but the numbers, locations, and types of activities remain speculative.

### D.2.5 Abandonment and Restoration of Production Sites

Abandonment and reclamation of satellite fields likely would coincide with abandonment and reclamation of corresponding CPFs. Abandonment operations would entail removing all equipment, cutting well casings a minimum of 3 feet below the surface, and plugging wells. Gravel or gravel/sand pads would not be removed, but allowed to bed naturally. Overall, abandonment operations would take many years, as revegetation and environmental monitoring studies would continue to document the long-term effects of operations at a particular site. A series of permitting and inspection activities would be associated with abandonment procedures (Lease Stipulation G-1). Abandonment activities would occur during winter months when ice roads could be constructed to allow the removal of equipment. Monitoring abandonment would require periodic revisits to gather information on environmental parameters related to natural bedding and to document the success of abandonment actions. Normally, one helicopter with a crew of three would visit the sites annually for the first 5 years, followed by visits with increasing time gaps over the next 10 years. Site visits would include a maximum of 1 day per visit, and 1 visit per year.

### D.2.6 Lease Stipulations and Required Operating Procedures

The final Preferred Alternative includes mitigating measures that are designed to reduce the potential take of spectacled and Steller's eiders. These measures are either lease stipulations (conditions that would apply to the lease) or ROPs (requirements that would apply to permits for activities associated with oil and gas operations). The full text for all stipulations and ROPs is given in Section 2.6 (Stipulations and Required Operating Procedures) of the Amended IAP/EIS. The following summarized stipulations and ROPs are directly applicable to eiders:

- Surveys would be required in the vicinity of proposed developments to direct project siting in a manner that prevents or reduces the taking of spectacled and Steller's eiders, and provides baseline information on the species near developments for impact monitoring.
- All utility and communications lines would be required to be buried in access roads or installed on the pipeline VSMs.
- All facilities greater than 20 feet in height would be required to have special lighting protocols. All communication towers, antennas, and similar facilities requiring support wires would be required to have markings to make support wires more visible to low-flying birds.
- All facilities would be required to be designed to prevent the nesting, denning, etc. of predatory species including gulls, ravens, raptors, foxes, and bears.
- Lessees would be required to develop oil-spill-response plans prior to any exploration or development drilling.
- Drilling pads and facilities would be relocated if necessary, up to 2 miles from the optimum pad location (the current North Slope maximum extended reach is 4 miles and a 2.5 departure ratio), if surveys indicated that relocation was necessary to avoid take.
- There would be restrictions on the establishment of permanent or temporary facilities on all deepwater lakes (lakes with depths greater than 13 feet); permanent facilities within ¼ mile of such lakes would be prohibited. No permanent facilities would be permitted in the streambeds of rivers. A no surface occupancy setback of ½ mile would be imposed on all major rivers (measured from the highest high water mark of the river, as determined by current hydrology at the time of application) for permanent facilities. Along rivers or river segments where subsistence concerns have been raised, setbacks for no surface occupancy would be increased to ¾ to 3 miles.
- Overland travel and associated activities for permitted uses would be restricted.

- Recreational off-highway vehicle (OHV) use would be restricted to winter use for snowmachines and other low-ground-pressure vehicles. Within the National Petroleum Reserve – Alaska, no summer recreational use of OHVs would be permitted. To support traditional subsistence activities and access, the summer use of OHVs, including all-terrain vehicles (ATVs) and airboats, would be allowed. The use of airboats during the summer would be limited to streams, lakes, and estuaries that are otherwise seasonably accessible by propeller- or jet-powered motorboat. To prevent impacts to soils, water quality, vegetation, and wildlife (especially nesting waterfowl), airboat use in areas of seasonal flooding of tundra and temporary shallow waters adjacent to streams, lakes, and estuaries would be prohibited.
- All facilities would be removed and rehabilitated to the satisfaction of the AO.

### D.2.7 Private Lands

The Arctic Slope Regional Corporation (ASRC) owns private lands in the Northeast National Petroleum Reserve – Alaska. The best available geologic information about these lands is from the two existing gas fields near Barrow. Currently, the area is thought to be gas prone, and without a transportation system to a larger market, it is unlikely that there would be extensive interest in leasing and developing those lands at this time. The development of ASRC lands is considered to be speculative at this time, but the potential construction of pipelines and support facilities associated with development of fields in the Planning Area would reduce the potential development costs of oil and gas fields on private lands.

### D.2.8 Other Key Assumptions

The North Slope Borough would be able to tax and receive income from the development of any oil and gas resources developed from the proposed activities. These taxes would add to the income available to the Borough for capital expenditures or to fund Borough operations. However, these potential projects would begin at the same time that income from other taxable projects, such as Prudhoe Bay, was declining. It is likely the additional income from these projects would offset the loss of income from fields that are declining or have been abandoned. While this income would be positive and beneficial, and would likely help maintain the current level of government activity and capital expenditure, it is unlikely to create a significant change in the growth rate of the communities on the North Slope, which could then increase subsistence or other pressures on eider populations.

## D.3 Description of Listed Eiders Occurring in the Northeast National Petroleum Reserve – Alaska

### D.3.1 Spectacled Eider

#### D.3.1.1 Population Status

The spectacled eider is a medium-sized sea duck that breeds along coastal areas of western and northern Alaska and eastern Russia, and winters in the Bering Sea (Petersen et al. 2000). Three breeding populations have been described: one in the Yukon-Kuskokwim (Y-K) Delta in western Alaska, a second on the North Slope of Alaska (Cape Simpson to the Sagavanirktok River), and the third in the Chaun Gulf and the Kolyma, Indigirka, and Yana River deltas of Arctic Russia. During the 1970s, approximately 50,000 female spectacled eiders nested in western Alaska. Data collected by the USFWS from ground-based study plots in the Y-K Delta suggested that the number of female spectacled eiders nesting in the Y-K Delta declined by approximately 8 to 14 percent per year from the 1970s to 1992 (Stehn et al. 1993, Ely et al. 1994). By 1992, the Y-K Delta spectacled eider population was reduced to approximately 4 percent of the population existing there in the 1970s, and it was federally-listed as a threatened species in 1993 (58 FR 27474).

Little information is available describing the status of the North Slope spectacled eider population prior to 1992. Historically, the North Slope population has likely been much smaller than the Y-K Delta population. The USFWS began conducting aerial surveys for breeding eiders in 1992 that have continued annually since then (Larned et al. 2003). The 1992 survey was flown too late in the season to be included in analyses with subsequent years, but since 1993 the North Slope spectacled eider population has remained relatively stable with a non-significant decreasing trend of approximately –0.7 percent corresponding to a mean growth rate of 0.99 (Larned et al. 2003). During this time period, the indicated total bird population index for the North Slope survey area has ranged from approximately 5,000 to 9,000 birds. The timing of surveys can influence the results of eider surveys and be an important factor when considering results of spectacled eider surveys (Troy Ecological Research Associates [TERA] 1997).

The latest population survey for the 2003 breeding season placed the ACP spectacled eider population index at 7,149 birds (Larned et al. 2003). The largest breeding population of spectacled eiders is located in Arctic Russia and the population there has been estimated at over 140,000 individuals (Hodges and Eldridge 2001). Based on estimates of the wintering population in the Bering Sea, the total world population may number around 375,000 birds (Larned and Tiplady 1999).

### D.3.1.2 Spring Migration

Spring migration routes of spectacled eiders are not well documented. Most of the data are from counts of eiders as they pass Point Barrow in late May and early June (Suydam et al. 1997, 2000). During spring migration, thousands of king and common eiders follow offshore leads, and small numbers of spectacled eiders have been recorded during spring counts. Richardson and Johnson (1981) also reported small numbers of spectacled eiders offshore during spring migration counts east of the Colville River at Simpson Lagoon, although some of these birds may have been local breeders rather than migrants. Few researchers have conducted inland counts of migrating birds on the North Slope, but Myers (1958) reported that the spectacled eider was the most abundant eider species migrating along river systems south of Barrow in the spring. Because only small numbers of spectacled eiders have been recorded migrating along the coast during spring, it may be that most birds migrate overland from the Chukchi Sea across the ACP following river drainages.

### D.3.1.3 Nesting

Spectacled eiders arrive on the North Slope breeding grounds paired in late May or early June. They occur in low densities across the North Slope from Wainwright to the Prudhoe Bay area. The highest concentrations occur within approximately 45 miles (70 km) of the coast in the Northwest National Petroleum Reserve – Alaska between Barrow and Wainwright, and in the Northeast National Petroleum Reserve – Alaska north of Teshekpuk Lake (USDOI BLM and MMS 1998; USDOI BLM and Ducks Unlimited 2002; Larned et al. 2003). Overall densities during the eider breeding population aerial surveys on the ACP have ranged from approximately 0.067 to 0.12 birds per $mi^2$ (0.174 to 0.305 birds per $km^2$) between 1993 and 2003 (Larned et al. 2003). The density during the 2003 breeding population survey was 0.09 birds per $mi^2$ (0.232 birds per $km^2$). Burgess et al. (2003a) reported spectacled eider densities of 0.008 to 0.015 birds per $mi^2$ (0.02 to 0.04 birds per $km^2$) during 2 years of aerial surveys in the eastern portion of the Planning Area. These estimates are lower than densities reported during aerial surveys for the Colville River Delta (0.08 birds per $mi^2$ [0.20 birds per $km^2$]; Burgess et al. 2003b, Johnson et al. 2003a), and in the Kuparuk oil field (0.03 birds per $mi^2$ [0.08 birds per $km^2$]; Anderson et al. 2003). During aerial surveys in the central-eastern portion of the Planning Area, Noel et al. (2001) reported higher densities of spectacled eiders in the Fish Creek Delta than in other portions of their study area. In the Planning Area, spectacled eiders have been reported consistently, and nests have been located during ground searches, in the vicinity of the U.S. Air Force Short-Range Radar Site at Point Lonely (Day et al. 1995; Day and Rose 2000; Ritchie et al. 2003). Burgess et al. (2003a) reported four spectacled eider nests discovered during ground searches on study plots in the eastern portion of the Planning Area.

In general, on the ACP, spectacled eiders breed near large shallow productive thaw lakes, often with convoluted shorelines and/or small islands (Larned and Balogh 1997), and nest sites are often located within 3 feet of a

lakeshore (Johnson et al. 1996). Spectacled eiders on the Colville River Delta have been reported to nest in salt-killed tundra, aquatic sedge with deep polygons, and patterned wet meadow, although only salt killed tundra was preferred based on an analysis of habitat selection (ABR 2002; Johnson et al. 2003a). In the Kuparuk oil field, Anderson et al. (1999) reported that spectacled eider nests were located in basin wetland complexes, a mosaic of water bodies with stands of emergents and complex shorelines with numerous islands and peninsulas. Spectacled eiders on the ACP nest mainly in areas near the coast rather than at inland locations (Derksen et al. 1981; Burgess et al. 2003b). Of 62 nests reported in the Colville River Delta, none were further than 8 miles (13 km) from the coast (Burgess et al. 2003b).

Based on a small sample size of band returns, there is some evidence that spectacled eider males, as well as females, may exhibit both breeding site and mate fidelity (TERA 1997). Females begin to lay eggs during the second week of June, and clutch sizes range from four to nine eggs, although five to six is more common (Dau 1974). The incubation period is approximately 26 to 28 days with eggs hatching around mid-July. Males depart the breeding grounds with the onset of incubation. Young leave the nest 1 to 2 days after hatching and begin feeding on their own immediately. Broods are quite mobile and may move as far as 0.6 to 1.9 miles (1 to 3 km) from the nest site within the first few days after hatching (TERA 1996). Some broods move to areas used for feeding by females prior to the onset of incubation. In the Y-K Delta, Grand et al. (1994 *in* TERA 1995) reported that one spectacled eider brood moved as far as 8.5 miles (14 km) from the nest site. In most cases, brood-rearing apparently does not occur in ponds adjacent to nest sites even if suitable habitat is present (TERA 1995), indicating that not only is nest site location important, but spectacled eiders may also require a much larger area in the general vicinity of the nest site for brood-rearing. After an initial post-hatch dispersal in the Prudhoe Bay area, there was a tendency for broods to settle into a particular area for a time, and then abruptly move to a new area. Successful females and young-of-the-year begin to depart the breeding grounds in late July, and movement continues until the end of August. Troy (2003) reported that Smith Bay was an area of concentration for female spectacled eiders located with satellite transmitters and that the area near the Stockton Islands may be a secondary area of concentration. Juvenile birds in the Y-K Delta departed the breeding grounds approximately 59 days after hatch (Flint et al. 2000a). Female and young spectacled eiders depart northern Alaska breeding grounds in August and September.

#### D.3.1.4 Post-nesting Period

Most males depart the breeding grounds in mid-June after the onset of incubation, moving to coastal bays and lagoons to molt and stage for fall migration. Important molting and staging areas include Harrison Bay and Simpson Lagoon, Smith Bay, Peard Bay, Kasegaluk Lagoon, Ledyard Bay, and eastern Norton Sound (LGL 1992; Larned et al. 1995; Springer and Pirtle 1997; Petersen et al. 1999; TERA 1999; Troy 2003). TERA (1999) and Troy (2003) reported that some males may travel overland to the Chukchi Sea, but that some birds remain about 6 miles (10 km) offshore in Harrison Bay for 7 to 10 days before continuing their fall migration to molting areas such as Ledyard Bay in the Chukchi Sea (Map 3-34). Males moving overland along the coast directly to the Chukchi Sea departed the breeding grounds earlier than those that lingered in the Beaufort Sea (Troy 2003). However, Petersen et al. (1999) reported that molting and fall migrations occurred in offshore waters, and found no evidence that spectacled eiders nesting on the North Slope migrate over the coastal plain. Fischer et al. (2002) reported that spectacled eiders were generally uncommon in offshore surveys from Harrison Bay to Brownlow Point, with small numbers occurring in July and August in Harrison Bay. During this time, Simpson Lagoon and Harrison Bay may be important staging areas for several weeks (Petersen et al. 1999, TERA 1999).

Early departing females may be non-breeders or have had failed nesting attempts. Troy (2003) reported that female spectacled eiders use Beaufort Sea waters from east of the Sagavanirktok River west to Barrow and beyond to the Chukchi Sea during fall migration. In the Planning Area, spectacled eiders have been reported during migration in the offshore waters of the Beaufort Sea near the mouth of the Colville River, Harrison Bay, and Smith Bay, and near the coast in the area northwest of Teshekpuk Lake (Map 3-34). Arrival onto molting areas, departure from molting areas to winter areas, and arrival onto wintering areas all follow a similar pattern: males are followed by unsuccessful females, who are followed by successfully breeding females (Petersen et al. 1999). It is likely that more female than male spectacled eiders migrate through the marine waters of the Beaufort Sea because more open

water exists in offshore areas when females depart than earlier in the year when males migrate. This availability of open water allows for more extensive use of marine habitats by later migrating birds. TERA (1999) reported that the average distance offshore for migrating males was 6.2 miles (10.1 km) compared to 13.5 miles (21.8 km) for migrating females. Troy (2003) reported that the average residency for females in the Beaufort Sea was almost 2 weeks with the Smith Bay area receiving the greatest level of use.

### D.3.1.5 Non-breeding Season

Spectacled eiders winter primarily in the Bering Sea south of St. Lawrence Island (Petersen et al. 1999; Petersen et al. 2000). Based on counts and photography from aerial surveys, this population may number around 360,000 to 375,000 (Larned and Tiplady 1999). The birds congregate here to forage for invertebrates at depths of 150 to 230 feet (45 to 70 meters) in areas of open leads. Petersen et al. (1998) reported that stomach samples from spectacled eiders collected near St. Lawrence Island included snails, clams, barnacles, amphipods, and crabs. The samples were collected during May and June of 1987 and 1992, and the primary species group consumed was the clam *Macoma* species. However, Lovvorn et al. (2003) reported that esophagi of spectacled eiders collected on the wintering grounds southwest of St. Lawrence Island in 2001 contained only clams, mostly *Nuculana*, with no trace of *Macoma*. The difference in diet in the two studies may reflect temporal differences in prey availability.

### D.3.1.6 Factors Affecting Population Status

The reasons behind declines in spectacled eider breeding populations are unknown. On the North Slope, historical data are lacking and the extent of declines there, if any, are difficult to assess. A number of potential factors that may have contributed to the spectacled eider population decline on the Y-K Delta have been identified, but the relative importance of each has not been determined.

Extensive research has been conducted on the effects of ingestion of lead shot by foraging birds. Lead poisoning has been confirmed to be a cause of mortality for spectacled eiders on the Y-K Delta. The first reports of lead poisoning in spectacled eiders came from four birds found dead or moribund on the Yukon Delta National Wildlife Refuge from 1992 to 1994 (Franson et al. 1995). Ingested lead shot was found in the lower esophagus of one bird, and analyses revealed higher than normal lead concentrations in the livers. Subsequent studies examined lead-exposure rates of Y-K Delta spectacled eiders (Flint et al. 1997). Ingested lead shot was detected in the gizzards of 11.6 percent of the birds sampled. During the brood-rearing period, 13.0 percent of the adult females and 6.6 percent of the adult males sampled had elevated blood lead levels, and during the brood-rearing period, 35.8 percent of the adult females and 12.2 percent of the ducklings had been exposed to lead. Flint and Grand (1997) also reported mortality of female spectacled eiders due to lead poisoning resulting from ingestion of lead shot, and speculated that lower adult female survival during the breeding season may be contributing to the overall population decline. Franson et al. (1998) collected 342 blood samples from spectacled eiders in the Y-K Delta and reported detectable lead in 58 percent of the samples. Detectable concentrations of lead occurred more frequently in females than in males, and maximum lead concentrations in the blood of females was greater than that of males and ducklings. Grand et al. (1998) reported that female spectacled eiders on the Y-K Delta exposed to lead prior to hatching their eggs survived at a much lower rate than females not exposed to lead before hatching. During a study of spectacled eider brood survival in the Y-K Delta, Flint et al. (2000a) reported detectable concentrations of lead in 73.7 percent of the bones of depredated female spectacled eiders and 21.1 percent of the duckling bone samples. Flint (1998) established experimental plots to determine the settlement rates of lead shot in wetland types commonly used by foraging waterfowl. There was no change in the proportion of lead shot collected in the surface layer of the habitats sampled over a 3-year period, suggesting that spent lead shot persists in waterfowl foraging habitat for many years.

Tundra nesting birds are subjected predation pressure from Arctic and red foxes (*Alopex lagopus* and *Vulpes vulpes*), grizzly bears (*Ursus arctos*), gulls, jaegers, ravens, and snowy owls (*Bubo scandiacus*). Some predators, such as ravens, gulls, Arctic fox, and bears, may be attracted to areas of human activity where they find anthropogenic sources of food and denning or nesting sites (Eberhardt et al. 1982, Day 1998, Burgess 2000). The availability of anthropogenic food sources, particularly during the winter, may increase winter survival of Arctic

foxes and contribute to increases in the Arctic fox population. Anthropogenic sources of food at dumpsters and refuse sites may also help to increase populations of gulls and ravens above natural levels. Major negative impacts have occurred at the Howe Island goose colony in the Sagavanirktok Delta from predation by Arctic fox and grizzly bears (Johnson 2000). Arctic foxes and glaucous gulls (*Larus hyperboreus*) are predators of common eider (*Somateria mollissima*) and brant (*Branta bernicla*) eggs and young on the barrier islands (Noel et al. 2002). Arctic fox predation can also impact tundra-nesting birds (Day 1998, Rodrigues 2002). Reduced levels of Arctic fox trapping on the North Slope may also have contributed to an increase in fox numbers (USDOI BLM 2003). Increased levels of predation due to elevated numbers of predators could impact nesting and brood-rearing spectacled eiders.

Subsistence harvest of eider eggs and adults occurs in coastal areas during the spring and fall. The annual subsistence harvest reported for the Y-K Delta and for the Bristol Bay area averaged 112 and 90 spectacled eiders, respectively, from 1995 to 2000 (Alaska Migratory Bird Co-Management Council 2003). Fewer data are available for other areas. In the Bering Strait mainland area, 23 spectacled eiders were reported harvested in 1995, and the subsistence harvest at St. Lawrence Island averaged five birds for 1993 and 1996. Few data are available from the North Slope villages documenting the numbers spectacled eiders harvested annually, and none were reported by AMBCC (2003). However, Stephen R. Braund and Associates and Institute for Social and Economic Research (SRBA and ISER 1993) reported 155 spectacled eiders taken at Wainwright during 1988 and 1989, and two taken at Barrow. Reported subsistence spectacled eider egg harvest in the Y-K Delta has averaged 11 eggs annually from 1995 to 2000. During the same period, the average annual spectacled eider egg harvest at the Togiak National Wildlife Refuge was 42 eggs. In both areas, the reported harvests actually occurred in 1 year but were averaged over the period from 1995 to 2000. Reporting on harvest of spectacled eiders and their eggs is probably not complete, and reported harvest numbers represent only minimum values. Actual harvest numbers are likely higher.

Exposure to contaminants, including petroleum-related compounds, organochlorine compounds, and elements, has also been proposed as a possible contributing factor in the decline of the spectacled eider population. Trust et al. (2000) sampled male spectacled eiders from St. Lawrence Island and reported that a few contained trace concentrations of chlorinated organic compounds. However, levels of copper, cadmium, and selenium were elevated when compared to literature values for other marine birds. Other elements that could potentially impact eiders include mercury, selenium, and zinc (Stout 1998; Stout et al. 2002). However, the birds sampled by Trust et al. (2000) appeared to be in good health, and if the presence of contaminants is a factor involved in the spectacled eider population decline, it may act by reducing fecundity or survival of young rather than via direct health impacts on adults.

There has been speculation that researchers conducting studies on avian nest density and success may inadvertently affect the results by attracting predators to nests and broods (Bart 1977, Götmark 1992). Birds that are flushed from their nests during surveys may be more susceptible to nest predation than undisturbed birds. Ongoing activities by researchers could cause some mortality to spectacled eider eggs and chicks. The collection of birds for dietary or contaminant studies obviously impacts small numbers of spectacled eiders. Implantation of satellite transmitters has provided the best information available on spectacled eider movements and locations of molting and winter areas, but the invasive nature of the surgery may impact the ultimate survival of a small number of birds.

In recent years, numerous studies have been conducted documenting global climate change and climate regime shifts that may affect various animal and plant populations (e.g., Mantua et al. 1997, Merrick 1997, Benson and Trites 2002). These studies document changes in variables such as ocean water temperatures at the surface and in the water column, atmospheric pressure, river outflows, polar ice recession, and others that influence the abundance and distribution of various species in marine ecosystems. The causes of these climatic regime shifts are unclear, but regime shifts that cause changes in primary productivity can affect other members of an ecosystem, including apex predators. Climatic regime shifts that alter the abundance and distribution of marine benthic invertebrates in the Bering Sea could have implications for spectacled and Steller's eiders wintering in this area (Lovvorn et al. 2003).

Naturally occurring factors, such as the effects of disease and parasites (Hollmén et al. 2000), predation (Martin 1997a, Day 1998), and weather may also affect spectacled and Steller's eider survival. In addition, eiders are potentially at risk from sources related to human activities including the accumulation of environmental pollutants (Stout 1998; Trust et al. 2000; Stout et al. 2002), and commercial fishing activities that may potentially affect winter feeding areas.

#### Recovery Plan

A Recovery Plan for spectacled eiders was published by the USFWS (USDOI USFWS 1996) to delineate reasonable actions which are believed to be required to provide for recovery and/or protection of this species. The plan summarizes facts known regarding the status of spectacled eiders, causes for the decline in the population, current management activities, and reasons for listing as a threatened species. The plan reviews strategies for promoting spectacled eider recovery including management actions and specific tasks directed to enumerate actions that address threats to spectacled eiders.

#### Critical Habitat

Critical habitat for the spectacled eider has been designated in molting areas in Norton Sound and Ledyard Bay, breeding areas in central and southern Y-K Delta, and wintering area in waters south of St. Lawrence Island. A total of 38,991 $mi^2$ (101,000 $km^2$) is designated as critical habitat for spectacled eiders. No critical habitat has been designated for spectacled eiders on lands administered by BLM in the National Petroleum Reserve – Alaska.

### D.3.2 Steller's Eider

Three breeding populations of Steller's eiders are recognized by the USFWS Steller's Eider Recovery Plan, two in Arctic Russia (Russian Atlantic and Russian Pacific populations), and one in Alaska (Fredrichson 2001, USDOI USFWS 2002). The Alaska population nests primarily on the ACP; however, a very small subpopulation exists on the Y-K Delta. Steller's eiders were formerly common breeders in the Y-K Delta, but numbers there declined drastically, and Kertell (1991) reported the Steller's eider as apparently extinct as a breeding species on the Y-K Delta. However, Flint and Herzog (1999) reported single Steller's eider nests in the Y-K Delta in 1994, 1996, and 1997, and three nests in 1998. Steller's eider density on the ACP is low. The largest population, which is located in eastern Russia, may number over 128,000 birds (Hodges and Eldridge 2001). In Alaska, Steller's eiders spend most of the year in shallow marine habitats along the Alaska Peninsula and the eastern Aleutian Islands to lower Cook Inlet, with stragglers south to British Columbia. In Eurasia, they winter from Scandinavia and northern Siberia south to the Baltic Sea, southern Kamchatka, and the Commander and Kurile islands (Johnson and Herter 1989). In the spring, the majority of the world population migrates along the Bristol Bay coast of the Alaska Peninsula, crosses Bristol Bay toward Cape Pierce, and continues northward along the Bering Sea coast (Larned 2003). Steller's eider was federally-listed as a threatened species in 1997 (62 FR 31748-31757) because of a reduction in the number of birds nesting in Alaska and substantial reduction in the breeding range in Alaska.

The range of Steller's eider range on Alaska's ACP apparently once extended from Wainwright east into the Canada's Northwest Territories (Johnson and Herter 1989; Quakenbush et al. 2002, and references therein). They are currently reported east at least to Prudhoe Bay (TERA 1997), but no recent records have been reported east of the Sagavanirktok River (Quakenbush et al. 2002). Steller's eider has not been recorded nesting east of Cape Halkett, other than one recent record inland near the Colville River (Quakenbush et al. 2002). Aerial surveys conducted by the USFWS indicate that Steller's eiders are widely distributed across the ACP in low densities (0.0045 birds per $mi^2$ [0.003 birds per $km^2$] in 2003; Larned et al. 2003) from Point Lay to the Sagavanirktok River, with very few sightings east of the Colville River. The highest concentrations occur near Barrow (Quakenbush et al. 1995, 2002; Ritchie and King 2002, 2003), although breeding there does not occur every year and may be related to predator/prey cycles (Quakenbush and Suydam 1999). During the 1990s, Steller's eider breeding at Barrow coincided with highs in the lemming population.

Based on aerial breeding pair surveys, Mallek et al. (2003) reported that the ACP Steller's eider population averaged around 1,000 birds from 1986 to 2001. Eider breeding population surveys conducted earlier in the year indicated a lower population, averaging around 170 birds from 1992 to 2003 (Larned et al. 2003). Differences in the two averages are likely related to survey timing. Larned et al. (2003) reported a non-significant population growth rate of 1.007 from 1993 to 2003 but, because of the small numbers of birds and high inter-annual variability, statistical tests probably lacked the power to determine significant trends. However, based on comparisons of historical and recent data, Quakenbush et al. (2002) suggested that a reduction in both occurrence and breeding frequency of Steller's eiders had occurred on the ACP, except in the Barrow area. Larned (2003) also reported a declining trend during annual spring surveys for Steller's eiders in the Bristol Bay area, although some of the variation may have been due to inter-annual variability in the timing of the eider migration that may have precluded portions of the population from being counted during some years.

Steller's eiders arrive on the ACP in early June, and evidence from the Barrow area suggests that nesting effort may vary from year to year (Quakenbush and Suydam 1999). At Barrow, Steller's eiders apparently nest during high lemming years when predators such as snowy owl and pomarine jaeger (*Stercorarius pomarinus*) that feed on lemmings are also nesting. Steller's eiders, as well as snowy owls and pomarine jaegers, may not nest at all during low lemming years. This cycle has been consistent since the initiation of intensive studies of Steller's eider nesting biology in the Barrow area in 1991, and has continued through 2003 (Quakenbush et al. 1995; Obritschkewitsch et al. 2001; Obritschkewitsch and Martin 2002a, b; Rojek and Martin 2003). Theoretically, an ample supply of lemmings may divert potential predators away from eider eggs and chicks, thus making it more advantageous for eiders to nest during years of high lemming populations. Some evidence also suggests that Steller's eiders may benefit by nesting close to nests of avian predators such as jaegers and snowy owls. These aggressive birds defend their own nests against other predators, and eider nests located nearby may benefit when potential predators are driven from the area. Other variables, such as weather and snow conditions, did not explain the inter-annual variability of eider nesting. Although intensive studies of Steller's eider breeding biology have been conducted in the Barrow area, little information is available for other portions of the ACP, including the Planning Area, where most information consists of scattered sightings during aerial surveys.

Steller's eider nests are most often found on tundra habitats, and are often associated with polygonal ground both near the coast and at inland locations. Emergent *Carex* and *Arctophila* provide import areas for feeding and cover. Males may remain on the breeding grounds for 2 weeks after the onset of the 24-day incubation period (Fredrichsen 2001). Clutch size ranges from three to eight, but averages five to six eggs. Nest success is variable, and ranged from approximately 14 to 71 percent at Barrow in the 1990s (Quakenbush and Suydam 1999). Nest predators include jaegers, common ravens (*Corvus corax*), glaucous gulls, and Arctic foxes. Steller's eider broods apparently are less mobile than those of spectacled eiders and remain in ponds with emergent *Carex* and *Arctophila* within a thousand feet of the nest site.

Male departure from the breeding grounds begins in late June or early July, after females begin incubation. Most of the available information on migration comes from Barrow, where birds disperse across the area from Admiralty Inlet to Wainwright and enter marine waters during the first week of July. They make use of coastal areas along the Chukchi Sea coast from Barrow to Cape Lisburne, and also use bays and lagoons of Chukotka (USDOI BLM 2003). Females that fail in breeding attempts may remain in the Barrow area into late summer (USDOI BLM 2003). Male, and non or failed-breeding, Steller's eiders concentrate in several lagoons on the Alaska Peninsula in August and September to molt (Flint et al. 2000b). Females and fledged young depart the breeding grounds in early to mid-September.

Causes for the decline of the Steller's eider population in Alaska are unknown, but may include increased predation pressure on the North Slope and Y-K Delta breeding grounds, subsistence harvest, and ingestion of lead shot and contaminants (Henry et al. 1995). Bustnes and Systad (2001) also suggested that Steller's eiders might have specialized feeding behavior that limits the availability of winter foraging habitat.

#### D.3.2.1 Recovery Plan

A Recovery Plan was published by the USFWS (USDOI USFWS 2002) to provide strategies to promote recovery of the Alaska breeding population of Steller's eiders to the point that protection under the ESA is no longer required. The interim objectives of the plan are to prevent further declines in the Alaska breeding population, protect Steller's eider breeding habitat, identify and alleviate causes of decline and/or obstacles to recovery, and determine size, trends, and distribution of the northern and western Alaska breeding populations.

#### D.3.2.2 Critical Habitat

For the Steller's eider, critical habitat has been designated in breeding areas on the Y-K Delta, staging area in the Kuskokwim Shoals, and molting areas in waters associated with the Seal Islands, Nelson Lagoon, and Izembek Lagoon in southwestern Alaska. A total of 2,830 mi$^2$ (7,330 km$^2$) is designated as critical habitat for Steller's eiders. There is no designated critical habitat for Steller's eiders on lands administered by the BLM in the National Petroleum Reserve – Alaska.

## D.4 Avenues of Take for Listed Eider species Resulting from Activities in the Northeast National Petroleum Reserve – Alaska

### D.4.1 Summer Seismic Surveys

The use of airguns for seismic work in Teshekpuk Lake during the summer could temporarily displace spectacled or Steller's eiders from preferred feeding habitats while surveys were being conducted. Because setbacks around the perimeter of the lake presumably would eliminate the potential for disturbance to eiders nesting near the lakeshore, only eiders using habitats in the open water of the lake would potentially be disturbed. Eiders displaced by seismic activities would likely return to preferred habitats after the airgun arrays passed through the area. Disturbance to threatened eiders near the shoreline could result from support activities, such as use of helicopters to transport personnel and supplies. Disturbance related to support activities could result in permanent or temporary displacement from nesting, feeding, or brood-rearing habitats. Conducting surveys after the completion of the nesting period would eliminate the potential for nest abandonment, but could impact hens and their broods.

### D.4.2 Habitat Loss in High Density Nesting Areas

#### D.4.2.1 Fill and Structures That Displace Use

The oil and gas development activities with the greatest potential for causing loss of spectacled and Steller's eider habitat are gravel mining and placement. North Slope oil field roads and pads are constructed using gravel, and tundra covered by gravel would no longer be available for eider nesting, brood-rearing, or foraging. This loss of habitat would continue for as long as the proposed development was in operation. As abandonment plans call for allowing gravel pads and roads to "bed" naturally, loss of habitat may be considered permanent, or at least considerably longer than the end of the operational life of the field. Habitat loss for eiders would be minimized by locating gravel roads, pads, airstrips, and mine sites in areas where eider use is infrequent. Under ROP E-11, aerial surveys would be conducted for at least 3 years prior to construction authorization for developments located within the USFWS North Slope eider survey area. If spectacled or Steller's eiders were present within the proposed development area, the applicant would be required to consult with the BLM and USFWS about the design and placement of roads and facilities.

Locating infrastructure in areas with low eider densities could reduce loss of occupied eider habitat. Although specific studies have not been conducted to investigate the population effects of eider displacement as a result of

infrastructure construction, spectacled and Steller's eiders displaced from nesting or brood-rearing sites may move to adjacent habitats. Anderson et al. (2003) and TERA (1996) reported spectacled eider nests within several hundred feet of roads and pads in the Kuparuk and Prudhoe Bay oil fields. Since nest site fidelity has been demonstrated by spectacled eiders (TERA 1997), it is possible that spectacled or Steller's eiders displaced from traditional nesting sites by gravel placement would remain in or return to the same general area and utilize similar habitats. Troy and Carpenter (1990) reported that returning shorebirds displaced by winter gravel placement may nest in adjacent habitats in subsequent years, and Johnson et al. (2003b) reported that waterbirds nesting near the Alpine field in the Colville River Delta that were displaced from nesting sites by gravel placement for oil field infrastructure likely moved their nests to nearby adjacent habitats.

The reasonably foreseeable development scenario specifies two developments, including CPF pads and satellite fields with adjoining roads and airstrips, one roadless pump station, up to six gravel extraction sites, and two staging areas that would create a total gravel footprint of approximately 1,356 acres (5.6 $km^2$; Table D-4). Loss of eider habitat could be permanent in the area occupied by the development footprint, and any eiders nesting in this area would be displaced to other areas. If spectacled and Steller's eider densities are assumed to be 2.85 and 0.16 birds per $mi^2$ (1.10 and 0.06 birds per $km^2$), which are relatively high estimates based on aerial survey data (Larned et al. 2003; Ritchie and King 2003), it is expected that 6.0 and 0.3 spectacled and Steller's eiders, respectively, could be directly displaced by the gravel footprint of the development, including the gravel extraction sites.

### D.4.2.2 Gravel and Other Hard Rock Mining

Gravel for construction of roads, pads, and airstrips would be mined from gravel extraction sites during the winter. Under the development scenario, six gravel extraction sites covering 20 to 50 acres each could be required. Under the maximum development scenario, 225 acres of potential eider habitat could be lost as a result of gravel extraction (Table D-4). If gravel extraction sites were located in areas of high eider concentration, where it is assumed that spectacled and Steller's eider densities are 2.85 and 0.16 birds per $mi^2$ (1.10 and 0.06 birds per $km^2$) respectively, approximately 1.8 and 0.1 spectacled and Steller's eiders would be displaced by the gravel extraction sites under the maximum development scenario.

**Table D-4. Gravel Footprint and Zones of Influence for Production and Effects on Eiders.**

| Development | Gravel Footprint in Acres ($km^2$) [1] | 200-Meter Zone of Influence in Acres ($km^2$) [2] | 500-Meter Zone of Influence in Acres ($km^2$) [3] |
|---|---|---|---|
| CPF developments (2) [4] | 161 (0.7) | 1,252 (5.1) | 4,019 (16.3) |
| Satellite developments (10) [4] | 872 (3.5) | 17,436 (70.6) | 46,803 (189.4) |
| Gravel extraction sites (8 at 20-50 acres each) | 225 (0.9) | Not Applicable | Not Applicable |
| Staging areas (2) | 100 (0.4) | 257 (1.0) | 939 (3.8) |
| Total Area | 1,356 (5.5) | 18,945 (76.7) | 51,761 (209.5) |
| Spectacled eiders affected (assuming density of 1.1 eiders per $km^2$) | 6.0 | 84.3 | 230.4 |
| Steller's eiders affected (assuming density of 0.06 eiders per $km^2$) | 0.3 | 4.6 | 12.6 |

[1] Includes only the gravel footprint of the structure.
[2] Includes only the area outside the structure but within 200 meters of the edge of the structure.
[3] Includes only the area outside the structure but within 500 m of the edge of the structure.
[4] Includes footprint of pads, roads, and airstrips.

### D.4.2.3 Damage to Tundra From Exploration and Other Winter Oil Field Activities

In addition to permanent habitat loss, temporary loss of habitat associated with gravel placement could occur on tundra adjacent to gravel structures, where accumulated snow from plowing activities or snow drifts could become compacted and cause delayed snowmelt. Delayed snowmelt persisting into the nesting season could preclude eiders from nesting in those areas. Delayed snowmelt and temporary habitat loss could also result from the construction and use of ice roads during winter activities.

Dust deposition could affect eider habitat by causing early green-up on tundra adjacent to roads and pads, which could attract spectacled and Steller's eiders and other waterfowl early in the season when other areas are not yet snow free. Birds attracted to these areas could be susceptible to injury or death if hit by traffic associated with roads and pads. Dust deposition could also increase thermokarst and soil pH, and reduce the photosynthetic capabilities of plants in areas adjacent to roads (Walker and Everett 1987; Auerbach et al. 1997). Traffic levels, air traffic (including helicopters), and wind could all influence the amount of dust that would be deposited adjacent to roads and pads. Assuming a 656-foot (200-meter) zone of influence around gravel infrastructure within which dust and snow deposition could impact eider habitats, approximately 84.3 spectacled and 4.6 Steller's eiders could be affected under the maximum development scenario (Table D-4).

Rolligons and track vehicles used during seismic exploration could leave tracks on tundra habitats that would affect vegetation, soil chemistry, soil invertebrates, and soil thaw characteristics, and cause small-scale hydrologic changes (Kevan et al. 1995). The most noticeably affected areas would include terrain with considerable microtopographic relief caused by mounds, tussocks, hummocks, and high-centered polygons. These areas are used by eiders for nesting and loafing. Wet areas would be less likely to be affected than drier sites (Walker 1996). Because snow would act as a buffer against these impacts, avoidance of areas with low snow cover, use of lightweight vehicles, dispersing traffic patterns, and minimizing sharp turns could help to minimize damage (Walker 1996). Required Operating Procedure C-2 would require measures to protect stream banks, minimize soil compaction, and minimize the breakage, abrasion, compaction, or displacement of vegetation while using heavy equipment during winter overland moves or seismic work.

Ice roads could also cause compaction of vegetation, which could affect the availability of cover for nesting eiders in the ice road footprint. Potential impacts to spectacled eiders from ice roads could be reduced by alternating ice road routes annually, by avoiding routes near known eider nesting locations, and by routing ice roads over habitats not preferred by eiders. Under the development scenario the annual construction of approximately 50 miles of ice road covering 212 acres are proposed. Assuming the same spectacled and Steller's eider densities used in the analysis of habitat loss and gravel mining (above), ice road construction could affect tundra habitat supporting 0.9 spectacled and 0.05 Steller's eiders.

Ice roads would connect to ice pads where winter drilling activities for exploratory and delineation wells would be conducted. As many as half of the ice pads could be multi-year pads used for summer activities such as storage of equipment. Tundra habitat under the footprint of multi-years pads would be lost as spectacled and Steller's eider habitat during the lifetime of the pad. Vegetation under the footprint of multi-year pads would be relatively unaffected after the pad melted (McKendrick 2000). Some vegetation within a 3- to 6-foot- (1- to 2-meter-) wide band around the perimeter of multi-year ice pads could be damaged and require several years to recover. Under the maximum development scenario, 50 multi-year ice pads and 50 single-season ice pads covering 6 acres each could be constructed, resulting in a total footprint of 600 acres during the life of the project. Assuming the same spectacled and Steller's eider densities used in the analysis of habitat loss and gravel mining (above), ice pad construction could affect tundra habitat supporting 2.7 spectacled and 0.2 Steller's eiders.

### D.4.2.4 Withdrawal of Freshwater From Lakes and Ponds

Construction of ice roads and pads involves water withdrawal from deep lakes near road and pad locations. Bergman et al. (1977) reported that spectacled eiders at Point Storkerson used deep *Arctophila* lakes during pre-

nesting, nesting, and post-nesting periods, and Derksen et al. (1981) reported that some spectacled eider brood-rearing occurred on deep open and deep *Arctophila* lakes in the National Petroleum Reserve – Alaska. Spectacled eider nests are often located within several feet of lake shorelines; therefore, water withdrawal from lakes during ice road construction that lowered the level of lakes could affect spectacled eider nesting habitat. Changes in the surface levels of lakes as a result of water withdrawal would be dependent on the amount of water withdrawn, the size of the lake, and the recharge rate. Lake studies would be conducted prior to water withdrawal for ice road construction, and the State of Alaska places restrictions on the amount of water that may be withdrawn from individual lakes. Most lakes would likely return to pre-withdrawal levels during spring flooding (Rovansek et al. 1996).

Required Operating Procedure B-2 would specify water withdrawal requirements based on lake size, depth, volume, and fish populations that could help minimize potential impacts to eider habitats. During winter water withdrawal operations, care should be taken to minimize or eliminate water withdrawal from deep, open and deep, *Arctophila* lakes that could be used by spectacled or Steller's eiders. Aerial and/or ground-based surveys of potential water withdrawal lakes conducted during the summer breeding and post-breeding season could identify lakes used by threatened eiders, and help to determine which lakes would be most suitable for water withdrawal activities to minimize potential impacts on threatened eiders.

#### D.4.2.5 Disruption/Alteration of Hydrology That May Possibly Destroy Habitat

Impoundments created by gravel structures could cause temporary or permanent flooding on adjacent tundra. Impoundments could be ephemeral and dry up early during the summer, or they could become permanent water bodies that would persist from year to year (Walker et al. 1987; Walker 1996). Tundra covered by impounded water could be lost as nesting habitat for some birds. However, impoundments could also create new feeding and brood-rearing habitat that would be beneficial to some bird species. Noel et al. (1996) reported that the areas occupied by impoundments in the Prudhoe Bay area generally supported higher waterfowl densities than the same areas did prior to development, and that spectacled eiders nested on some impoundments. Warnock and Troy (1992) and Anderson et al. (1992) also reported use of impoundments in the Prudhoe Bay and Kuparuk oil fields by spectacled eider. Kertell (1993, 1994) reported few differences in numbers of invertebrates and Pacific loons when comparing use of natural ponds and impoundments in the Prudhoe Bay area. He also reported that feeding and resting ducks were more abundant on impoundments than natural ponds, although this difference was not significant. The effects of impoundments could be minimized or eliminated by using engineering plans that provided culverts to allow for adequate cross-drainage at gravel structures. However, culverts blocked by snow or ice could prolong the spring flooding period (Walker 1996).

### D.4.3 Oil Field Disturbance

Activities related to oil development and production in the Planning Area, such as vehicle, aircraft, pedestrian, and boat traffic; routine maintenance activities; heavy equipment use; and oil-spill clean-up activities, could cause disturbances that would adversely affect threatened eiders. These disturbances could result in nest abandonment or decreased nest attendance, and increased energy expenditures that could affect the physiological condition of birds and their rate of survival or reproduction.

#### D.4.3.1 Construction Period (Pads, Roads, Runways, and Pipelines)

Installation of pipelines and placement of gravel for oil field infrastructure (e.g., roads, airstrips, and pads associated with well, camps, staging areas, and processing facilities) would be conducted during the winter. Because eiders are not present in the Planning Area during winter, there would be no disturbance to threatened eiders associated with construction of infrastructure in the Planning Area. The potential effects of permanent and temporary habitat loss associated with these activities are discussed in the section on habitat loss.

### D.4.3.2 Pad Activity

Various types of disturbances associated with oil and gas operations, such as vehicular traffic, machinery, facility noise, and pedestrian traffic, may occur on pads. Some of these disturbances, such as vehicular traffic, may also occur on roads and are therefore discussed below in Section D.4.3.5 (Roads).

Because spectacled and Steller's eider densities in the Planning Area are low, few studies have documented responses of threatened eiders to oil field disturbances, although Anderson et al. (1992) reported that during the nesting period, spectacled eiders near the GHX-1 facility in the Prudhoe Bay area appeared to adjust their use of the area to locations further from the facility in response to noise. Disturbance from facility noise could affect the activity and energy budgets of spectacled and Steller's eiders.

TERA (1996) reported no conspicuous avoidance of facilities in the Prudhoe Bay oil field by brood-rearing spectacled eiders. Brood movement was extensive during the first few days after hatching, and broods often spent a portion of their time within 656 feet (200 meters) of facilities, including high-noise areas such as gathering centers and the Deadhorse airport. Spectacled eiders may be able to acclimate to periodic, but regularly occurring, disturbances related to oil field activities on roads and pads. A potentially more serious situation could develop if spectacled or Steller's eiders nested near roads or pads where little or no activity occurred early during the nesting period, but activity did occur later in the summer. In such cases, nest failure or abandonment by eiders could occur, as nesting eiders might not be acclimated to oil field activities.

Evidence suggests that pedestrian traffic may have a greater negative impact than vehicular traffic on some birds. Pedestrian traffic is likely to occur on well pads during well maintenance activities, and more regular pedestrian traffic is likely to occur on larger pads that support camps and production facilities. During a study of the effects of disturbance related to the Lisburne Development in the Prudhoe Bay oil field, Murphy and Anderson (1993) reported that of the more common sources of disturbance, humans on foot elicited the strongest reactions from geese and swans. Ritchie (1987) reported that pedestrians caused greater disturbance to nesting raptors than other sources of disturbance. Restricting or reducing the level of foot traffic on gravel roads and pads, particularly in areas adjacent to potential spectacled and Steller's eider habitat, could help to reduce the potential for disturbance to nesting or brood-rearing eiders.

Two CPF developments and 10 satellite developments, entailing 13 pads covering approximately 216 acres in total, are proposed under the development scenario. A 656-foot (200-meter) buffer around the developments would result in a zone of influence covering 1,140 acres within which disturbance could affect threatened eiders. If spectacled and Steller's eider densities are assumed to be 2.85 and 0.16 birds per $mi^2$ (1.10 and 0.06 birds per $km^2$), 5.1 and 0.3 spectacled and Steller's eiders, respectively, would potentially be affected by disturbance related to activities at the developments. If the zone of influence is increased to a 1,640-foot (500-meter) buffer, 21.3 spectacled eiders and 1.2 Steller's eiders could be affected by disturbances related to the developments.

### D.4.3.3 Staging Area Activity

It is likely that staging areas would be established on the coast to support development activities. Summer barge traffic would occur from mid-July to early October, with barges used to transport equipment to coastal staging areas for storage until they could be transported to exploration or development sites during winter. Summer activity at staging areas would require the use of heavy equipment for offloading and storage of equipment and supplies from barges. Disturbance to eiders could result from equipment noise and movement, and from pedestrian activity. The types of disturbances would be the same as those described for other oil field activities, although their potential to affect threatened eiders could be reduced, given the smaller size of staging areas compared to the proposed development scenario for the Planning Area. Under the maximum development scenario, two staging areas covering approximately 100 acres could be in operation. A 656-foot (200-meter) buffer around the staging area would produce a 257-acre zone of influence that could affect habitat supporting 1.1 spectacled and 0.1 Steller's eiders. A 1,640-foot (500-meter) buffer around the staging areas would produce a 939-acre zone of influence that could affect habitat supporting 4.2 spectacled and 0.2 Steller's eiders.

### D.4.3.4 Aircraft

Both fixed-wing aircraft and helicopters could be used to transport personnel, supplies, and equipment to airstrips or staging areas during development and production activities in the Planning Area. The potential for disturbance to waterfowl from aircraft is well documented (e.g., Schweinsburg 1974; Ward and Stehn 1989; Derksen et al. 1992; McKechnie and Gladwin 1993), although few studies have reported specifically on spectacled or Steller's eiders. Johnson et al. (2003b) conducted the most thorough study of aircraft disturbance to waterfowl in the Arctic at the Alpine field on the Colville River Delta. Responses of birds to aircraft include alert postures, interruption of foraging behavior, and flight. Such disturbances may displace birds from feeding habitats and negatively impact energy budgets. Gollop et al. (1974) suggested that helicopters may be more disturbing to wildlife than low-flying fixed-wing aircraft, although Balogh (1997) indicated that fixed-wing aircraft flown at 150 feet often caused spectacled eiders to flush, while helicopters flown at similar altitudes in the vicinity of Prudhoe Bay did not.

#### Oil Field Support

The effects of routine aircraft flights into airstrips could range from avoidance of certain areas by eiders to abandonment of nesting attempts or lowered survival of young. The potential for noise associated with aircraft to have negative impacts on eiders would probably be greatest during the nesting period when the movements of incubating eiders are restricted. The highest levels of aircraft noise would occur during takeoffs as engines reached maximum power levels. During landings, levels of aircraft noise would be reduced as engine power decreased. In the Planning Area, aircraft activity would likely be greater during the construction period, when more personnel and equipment would be transported to areas being developed, than during the production period, when activity levels would be reduced.

The Alpine field avian monitoring program in the Colville River Delta was a multi-year project designed to identify the potential effects of aircraft noise and disturbance on birds nesting near the airstrip and on large waterbirds during brood-rearing (Johnson et al. 2003b). The average number take-offs and landings of all types of aircraft combined at the Alpine field airstrip during the summer breeding season was greater during construction period in 2000 (41.8 take-offs and landings per day; Johnson et al. 2001, 2003b) than in the number of summer operational flights in 2004 (15 take-offs and landings per day; ConocoPhillips Alaska, Inc. unpubl. data). Other sources of disturbance included vehicle and pedestrian traffic, and predators. Although spectacled eiders nested in the general area, none nested in the study area, so the effects of aircraft disturbance reported by Johnson et al. (2003b) do not pertain specifically to spectacled eiders. However, it is reasonable to assume that spectacled eiders (and Steller's eiders, which occur at much lower densities) would have a respond to aircraft disturbance similar to that of other waterfowl in the study area.

The number of waterfowl nests located within 0.6 miles (1,000 meters) of the airstrip at the Alpine field declined after construction began, as compared to pre-construction levels (Johnson et al. 2003b). However, the number of nests located between 0.6 miles (1,000 meters) and 0.9 miles (1,500 meters) of the airstrip increased. The decline near the airstrip could not be directly linked to disturbance, because other factors, such as lower than normal temperatures and severe flooding later into the breeding season during construction years, may also have influenced nest densities. During years of heavy construction, nests of white-fronted geese (*Anser albifrons*) were apparently displaced to habitats similar to those used prior to construction at locations further from the airstrip. Johnson et al. (2003b) suggested that preferred white-fronted goose nesting habitats in the Alpine field development area had not been saturated with nests prior to development. Generally, white-fronted geese exhibited statistically non-significant and weak distributional changes in relation to sources of disturbance at the Alpine field, including increased noise levels, aircraft, vehicles, and pedestrians, which suggests that the geese moved their nests away from the gravel footprint and the noisiest areas, but not enough to be detected at the larger scale of approximately 1.2 miles (2,000 meters) surrounding the airstrip. The difference in distributions of nests between pre-construction and heavy construction years appeared to occur within the first 2,300 feet (700 meters) surrounding the airstrip (Johnson et al. 2003b).

At the Alpine field, white-fronted geese at failed nests were more likely to take incubation recesses than geese at successful nests. A higher frequency and duration of recesses may allow for increased predation by jaegers, gulls, ravens, and foxes at unattended nests. The probability of taking a recess increased as noise level increased, when aircraft were present, when the number of vehicles decreased, and when pedestrians were present. Geese nesting less than 1.2 miles (2,000 meters) from the airstrip were more likely to take a recess than birds nesting greater than 1.2 miles (2,000 meters) from the airstrip. Of the various disturbance types, helicopters were the least predictable because they did not have a restricted flight pattern. Incubating white-fronted geese and tundra swans (*Cygnus columbianus*) reacted to fixed-wing aircraft more often than helicopters, although monitored nests were closer to the airstrip than to the helipad. Airplanes and pedestrians elicited the highest rates of response from incubating geese, and vehicles the lowest. Nonetheless, successful white-fronted goose nests were generally closer to the Alpine field airstrip, the flight path, and the nearest gravel than unsuccessful nests, although most comparisons were not significant (Johnson et al. 2003b).

Johnson et al. (2003b) also reported on tundra swans and yellow-billed loons (*Gavia adamsii*) nesting near the Alpine field airstrip. There was no difference among years in the mean distance of tundra swan nests relative to the airstrip, closest gravel, or aircraft flight path. In 1998, a tundra swan nested successfully 520 feet (160 meters) northeast of the airstrip, despite daily helicopter activity at the airstrip during late June and early July. Another pair of tundra swans nested successfully from at least 1997 through 2002 at a site approximately 1,500 feet (450 meters) southwest of the airstrip and 475 feet (145 meters) from the infield road. The nest site was moved slightly during 2001, perhaps in response to increased vehicle traffic, but the original site was again occupied in 2002. These nests hatched successfully despite their proximity to the airstrip and their locations under the takeoff and approach patterns of aircraft. Johnson (1984) reported that at least three common eider hens nested successfully within 1,000 feet (330 meters) of a helicopter landing pad on Thetis Island offshore from the Colville River Delta that averaged approximately 12 flights per day. Disturbance effects of the various components of the Alpine field apparently were not severe enough to cause major changes in the selection of nest sites by tundra swans (Johnson et al. 2003b). Similarly, no evidence was found for disturbance effects on the distribution and abundance of yellow-billed loon nests near the Alpine field airstrip, although the sample size was small.

There is a potential for numerous overflights, landings, and takeoffs to displace some nesting eiders near routinely used aircraft landing sites. However, although the reaction of eiders to aircraft is unknown, there is also a potential for habituation to routine air traffic by spectacled eiders. In the Prudhoe Bay area, nests have been reported in wetlands within approximately 0.45 mile (750 meters) of the Deadhorse Airport (TERA 1996), including one less than 0.15 mile (250 meters) from the runway (Martin 1997b), suggesting that some nesting individuals are tolerant of aircraft activity. Given that spectacled and Steller's eiders occur in low densities in the Planning Area, and given the potential for habituation to aircraft disturbance, the potential for disturbance related to aircraft activity to negatively impact threatened eiders is probably low. However, spectacled eiders are sometimes known to nest at traditional colonial sites (TERA 1996; Anderson et al. 2003), and airports and landing strips should be located away from colonial nesting areas if possible. The ROP F-1 and Stipulation K-4 should help to minimize the potential effects of aircraft on spectacled and Steller's eiders by limiting air traffic in and around the goose molting lakes north of Teshekpuk Lake from May 20 to August 20.

A 1,640-foot (500-meter) buffer established around an airstrip 0.6 miles (1,000 meters) in length would produce a zone of influence in habitat capable of supporting 3 spectacled and 0.2 Steller's eiders. A 0.6-mile (1,000-meter) buffer established around the airstrip would produce a zone of influence in habitat capable of supporting 7 spectacled and 0.4 Steller's eiders.

### Increased Research

The potential effects of low-level aerial survey flights for monitoring bird or caribou populations on eiders are unknown. In general, however, disturbance of a particular area would be of short duration, and surveys would cover only a small percentage of the ACP each season. Such flights would likely cause negligible disturbance to eiders. In the northeastern portion of the Planning Area, wildlife survey activity would likely be more frequent

during a 3-week period in June and July. During this time, the area of disturbance in the Planning Area would be increased, or certain areas would be disturbed more intensively than others.

Eiders could be disturbed by helicopters used for studies in which caribou and grizzly bears are captured for attachment of radio collars. It is expected that relatively few nest sites would be affected, because eider nest sites generally are scattered at relatively low densities over the ACP and in the Planning Area. Effects resulting from aircraft activity would be difficult to quantitatively separate from natural variation in population numbers. Activity levels and associated disturbance to threatened eiders at remote research camps would probably be reduced compared to the amount occurring at active development sites where aircraft traffic levels would be much higher.

Overflights of support aircraft or aircraft conducting waterfowl surveys could occur during the open-water period when spectacled and Steller's eiders may be staging in the nearshore waters of the Planning Area. Overflights would be brief, and disruption of eider foraging or resting behavior would be minimal. Support aircraft could be routed inland and/or at elevations sufficient to minimize or eliminate disturbance. Aerial survey aircraft could cause more disturbance than support aircraft because they could fly at low elevations during surveys. Required Operating Procedure F-1 would require measures to minimize the effects of low-flying aircraft on wildlife, traditional subsistence activities, and local communities.

Summer camps requiring fixed-wing aircraft or helicopter support could be established to study wildlife populations, archeological sites, or other resources in the Planning Area. During 2002 and 2003, summer camps were established southeast of Teshekpuk Lake to study king eiders (Powell et al. 2004). In some cases supplies could be cached at research campsites during the winter when eiders are not present. Research camps would likely be active for 6 to 12 weeks during the summer breeding season. In most cases, the effects of aircraft associated with re-supply activities for large research camps would likely be short-term because re-supply flights would be infrequent. Eiders displaced by aircraft activities near airstrips or landing zones would be able to return to preferred habitats shortly after completion of the re-supply mission. However, given the infrequency of re-supply flights at research camps, eiders might not be able to habituate to aircraft disturbance, and some eiders could be displaced from preferred habitats for the duration of the research activity. Locating research camps away from areas of high spectacled and Steller's eider concentrations could help to reduce the effects of aircraft activity. However, this precaution would not be possible if the purpose of the research camp was to study threatened eiders. It is important to note that any research not directly related to the action being considered here would require separate consultation.

#### Increased Recreation

Recreational use of the Northeast National Petroleum Reserve – Alaska is unlikely to increase from implementation of the Final Preferred Alternative. Current levels of use by aircraft could disturb small amounts of habitat associated with off-airstrip landings, and recreational camps trample small areas of vegetation. Impacts to eiders would be limited to behavioral disturbance associated with the aircraft and presence of the camps, but a similar level of impact would be expected even if no development occurred in the area.

#### Increased Village Aircraft Activity

The final Preferred Alternative is unlikely to increase aircraft traffic into the villages, since development facilities in the National Petroleum Reserve – Alaska would have their own airstrips.

### D.4.3.5 Roads

#### Oil Field Support

Spectacled and Steller's eiders could be subjected to disturbances related to vehicular and pedestrian traffic and noise from equipment on roads and at facilities. Vehicular traffic, including large trucks, hauling cranes, and other equipment, and road maintenance equipment on access roads and pads, could impact threatened eiders during

summer activities in the Planning Area. In the North Slope oil fields, these types of disturbances have been documented for brant, and Canada (*Branta canadensis*) and white-fronted geese, and have been shown to have greater effects on geese feeding close to roads than on geese feeding further away (Murphy et al. 1988; Murphy and Anderson 1993). Disturbances occur most often during the pre-nesting period when these birds gather to feed in open areas near roads, and during brood-rearing and fall staging when some geese exhibit higher rates of disturbance (e.g., "heads up" behavior) in areas near roads than do birds in undisturbed areas. A small percentage of birds may walk, run, or fly to avoid vehicular disturbances (Murphy and Anderson 1993). Disturbance occurs most often within 164 feet (50 meters) of roads. However, some disturbance has been reported for birds as far as 490 to 690 feet (150 to 210 meters) from roads (Murphy and Anderson 1993).

The effects of disturbance to threatened eiders near roads and pads would likely differ depending on the reproductive stage. Anderson et al. (2003) reported that pre-nesting pairs of spectacled eiders in the Kuparuk oil field were located nearer to roads than nesting females. However, both Anderson et al. (2003) and TERA (1996) reported locations of spectacled eider nests that were within a few hundred meters of oil field facilities. Anderson et al. (2003) also reported that there was no significant difference in the distance of failed versus successful spectacled eider nests from oil field facilities.

Gravel placement for roads and well pads would be unlikely to cause physical obstructions to movements of threatened eiders. During the period when eiders can fly, they can easily move over or around these structures. Gravel roads and pads could present some temporary obstructions during brood-rearing and molting periods when birds are flightless, particularly if traffic levels are high (Murphy and Anderson 1993). However, TERA (1996) reported that spectacled eider broods moved extensively, averaging 0.33 miles (0.53 km) per day during the first week after hatch and that some of the longest movements occurred during the first day or two after hatch. Spectacled eider broods did not avoid facilities and broods were known to cross roads; one brood crossed roads repeatedly (TERA 1996).

An analysis of the numbers of eiders that could potentially be disturbed by the gravel footprint of the development and in 656-foot (200-meter) and 1,640-foot (500 meters) buffers (or zones of influence) around the gravel footprint of the development scenario is shown in Table D-4. Spectacled and Steller's eider densities are assumed to be 2.85 and 0.16 birds per $mi^2$ (1.10 and 0.06 eiders per $km^2$), respectively. The analysis concluded that the total gravel footprint would displace 6.0 and 0.3 spectacled and Steller's eiders, respectively. The CPFs and satellite developments include a total of 103 miles of gravel road among the 13 developments. The gravel foot print of these roads totals approximately 773 acres and could displace 3.4 and 0.2 spectacled and Steller's eiders respectively. In the 656-foot zone (16,840 acres) of influence surrounding these roads, 75.0 spectacled and 4.1 Steller's eiders could potentially be disturbed, and in the 1,640-foot zone (43,730 acres) of influence, 194.7 and 10.6 spectacled and Steller's eiders, respectively, could potentially be disturbed. These numbers are probably high estimates, and the analysis assumes that no mitigating measures would be in place. Stipulations and ROPs would specify mitigation measures for siting of facilities, would require the use of fences to shield eiders from human activity on pads, and would place restrictions on aircraft use that would likely reduce the potential for aircraft to disturb spectacled and Steller's eiders.

### Village Access

Most of the National Petroleum Reserve – Alaska is currently accessible to villages in the area by off road vehicles (four wheelers and snowmachines). Under the proposed alternative, access would not be increased unless roads were built that connected the developments directly to the North Slope road system.

### Recreation/Tourism

Roads associated with potential development in the National Petroleum Reserve – Alaska would be unlikely to increase recreational use and tourism in the Planning Area.

### D.4.3.6 Watercraft-based Support

Barge traffic associated with the transportation of equipment and supplies could be present during the open-water period from mid-July to early October. The use of barges to transport heavy equipment could require the construction of two staging areas along the coast, that could cover up to 50 acres each, for storage of equipment before moving it to inland locations. There would likely be two large sealifts (1 year apart) for each CPF development, and up to 20 barges per year during the development period. Barge routes could pass through shallow, nearshore habitats of the Beaufort Sea adjacent to the Planning Area that are known to be used by spectacled eiders (Map 3-33; TERA 1999, Fischer et al. 2002, Troy 2003). Spectacled eider groups most likely to encounter vessel traffic would be failed nesting females and females with young. Most males would have departed the area by late June or early July before the onset of vessel traffic. Spectacled eiders are uncommon in the offshore waters of the Planning Area, but Fischer et al. (2002) reported that when spectacled eiders were sighted they occurred in relatively large flocks. The mean spectacled eider flock size during surveys in 1999 and 2000 was 21 eiders. Small numbers of Steller's eiders could also occur in this area. Vessel traffic could cause temporary disturbance to feeding eiders if barges were to pass through feeding habitat. The disturbance would be short-term, and eiders would be able to swim or fly to avoid oncoming vessel traffic. The low number of barges involved would also minimize disturbance to eiders. Given the low density of spectacled and Steller's eiders in the offshore waters of the Planning Area, few barges would be likely to cause disturbances to eiders. Based on the mean flock size, barges that did encounter spectacled eiders would likely cause disturbance to about 20 eiders. Eiders could also collide with barges during poor weather.

Activity sites, including exploration, drilling, and production sites, are required to have an oil-spill response plan with trained personnel and cleanup equipment at each site, in accordance with federal, state, and Borough regulations. Spill response requirements would be thoroughly addressed when and if parcels were leased, and three spill drills would be required every 3 years.

Spill response training activities using small boats on lakes would have the potential to disturb foraging, nesting, or brood-rearing eiders. During oil spill response training drills, 20 to 40 people would participate for 1 to 2 days annually at each CPF development. There is little information on the potential impacts of boat disturbance on spectacled and Steller's eiders, but boat activity can cause alert postures, disruption of feeding behavior, and flight in other waterfowl, shorebirds, and raptors (Burger 1986, Belanger and Bedard 1989, Steidl and Anthony 2000). To minimize the potential for boat disturbance, set-back distances for boat activity for various bird groups ranges from 330 feet (100 meters) for shorebirds to 600 feet (180 meters) for wading birds (Rodgers and Smith 1995, Rodgers and Schwikert 2001). Conducting these activities in areas not frequented by eiders should help to reduce the likelihood that boats would impact threatened eiders. During the incubation period, up to two or three incubating hens could be disturbed if training activities occurred at a location where several pairs were nesting in close proximity. During the brood-rearing period, oil spill response training activities could affect hens with broods. Pre- and post-development surveys would be able to identify lakes where eider activity would be unlikely, and use of these lakes for oil spill response training would minimize the potential for activities to affect spectacled and Steller's eiders.

### D.4.3.7 Pipeline Maintenance

Most pipelines would not be associated with roads, and routine maintenance of pipelines would be conducted during the winter when eiders are not present in the Planning Area. Routine maintenance activities during the winter would not cause any disturbance to threatened eiders. Although emergency maintenance or repairs would be unlikely to occur during the summer, such activities would have the potential to affect eiders. The level of impact would depend on the location and type of maintenance or repair activities. Given the low densities of spectacled and Steller's eiders in the Planning Area, the probability that emergency maintenance or repair activities would occur in an area occupied by threatened eiders is low. If these activities did occur in an area occupied by eiders, their effects could range from short-term displacement to nest abandonment and loss of breeding opportunity for the season. Helicopter activity at remote locations could have a greater impact than vehicular activity at locations along roads where eiders may be more accustomed to human activity.

Helicopters would be used on a weekly basis for surveillance to examine oil pipelines for leaks or damage. Helicopter surveillance flights could cause disturbance that would temporarily displace eiders from preferred feeding, nesting, or brood-rearing habitats. Under the maximum development scenario, up to 205 miles of pipeline could be constructed across numerous tundra habitats. A 1,640-foot (500-meter) buffer established around 205 miles of pipeline would include habitat that could support 363 spectacled and 20 Steller's eiders, assuming eider densities of 2.85 and 0.16 birds per $mi^2$ (1.10 and 0.06 spectacled and Steller's eiders per $km^2$), respectively. Although 363 spectacled and 20 Steller's eiders may use habitats within this buffer, far fewer eiders would likely be disturbed by helicopter surveillance of the pipeline. Displaced eiders would likely return to preferred habitats after surveillance surveys were completed, and some eiders could habituate to helicopter activity.

#### D.4.3.8 Tower Maintenance

Local companies could construct up to two cellular telephone towers in the Planning Area. Maintenance of communication towers would likely cause no more disturbance to threatened eiders than other pad activities, though it could potentially disturb eiders several times during the breeding season, as these sites would probably be remote and accessed by helicopter. Helicopters and ground personnel near areas of eider activity could cause displacement of eiders from foraging areas, disruption of incubation, nest abandonment, or disturbance to broods. Locating cellular telephone towers in habitats not frequented by threatened eiders would minimize or eliminate these potential disturbances.

#### D.4.3.9 Gravel Mining/Transport

Gravel mining and transport during construction of infrastructure would occur during the winter when threatened eiders are not present in the Planning Area. Gravel mining and transport would not cause disturbances that affect spectacled and Steller's eiders. The potential effects of habitat loss associated with gravel mining and transport are discussed in the section on habitat loss.

#### D.4.3.10 Oil Spill Response Activity/Training

Although the likelihood of an oil spill in areas occupied by spectacled or Steller's eiders is low, oil spills and associated clean-up procedures must be considered. The effects of oil spills in terrestrial and marine environments are considered in Section 4.2.2 (Oil Spills) of the amendment; here we consider the effects of oil clean-up activities in terrestrial environments associated with gravel roads and pads.

Oil spill response and clean-up activities would be immediate, and could not be planned to avoid eider habitats. Clean-up activities would involve the use of vehicles, equipment, and ground personnel, and their effects would be similar to those described for other activities associated with gravel roads and pads. Depending on the location and activity of eiders in relation to the spill, eider response could include anything from alert responses to nest abandonment. Clean-up activities at an oil spill associated with a pipeline located some distance from the road system could require helicopter support in addition to ground personnel with equipment. In this scenario, clean-up activities would be more likely to affect eiders unaccustomed to human activities.

### D.4.4 Collisions (Strikes)

Structures and equipment associated with oil development and production that could represent potential collision hazards to spectacled or Steller's eiders include drill rigs, production and support facilities, pipelines, vehicles (trucks, heavy equipment), barges and other vessels, power and communication lines and towers, and bridges. Good visibility associated with extended day length during the summer breeding season would minimize the potential for eider mortality due to collisions with any of these structures. The greatest potential for eider collisions would occur during periods of reduced visibility, such as rain or foggy conditions. Placement of lighting on potentially hazardous structures could help to minimize eider mortality due to collisions. Required Operating Procedures E-10 and E-11 would establish measures to prevent migrating waterfowl from striking oil and gas

facilities during low light conditions, and to reduce the possibility of spectacled or Steller's eiders striking aboveground utility lines.

#### D.4.4.1 Drill Rigs

Drill rigs and production facilities, which would be located onshore on gravel pads, could present a hazard to local movements of eiders, particularly during periods of low light or fog. Quakenbush and Snyder-Conn (1993) reported that a Steller's eider was apparently killed by collision with a tower near Nanvak Bay. Day et al. (2002) concluded that the probability of collisions of migrating eiders with existing structures at Barrow was low, but this finding was influenced by the offshore route followed by most eiders during fall migration. The potential for such collisions would likely be low because of constant daylight and good visibility during the summer season. In addition, this equipment would usually have a low profile and be located in a small area. The greatest chance for eider collisions with exploration equipment would occur during periods of foggy weather or other conditions that reduced visibility. Required Operating Procedure E-10 would establish guidelines for illuminating drilling structures, production facilities, and other structures that exceed 20 feet in height.

A typical drill rig used on the North Slope consists of a base structure which at ground level is approximately 30 feet by 40 feet and rises above the ground approximately 35 feet to the rig floor. Drill rig derricks extend approximately 150 feet above the rig floor, and could present a potential collision hazard.

Virtually all exploration drilling activities would occur during the winter when eiders are not present. Some exploration drilling equipment, such as pipe racks, drill rigs, towers, and other machinery, may be stored on ice-pads or on existing gravel pads over summer and could present a collision hazard to eiders. However, such rigs are typically stored (stacked) with the derrick laying down parallel to the ground. Federal Aviation Administration permits are required for such structures and are often conditioned so that they require the derrick to be laid down. Thus, exploration drilling poses little or no opportunity for eider collisions.

Development and production drilling can, and is often, conducted year-round from gravel pads. Therefore these drilling activities present opportunities for eider collisions with drill rig derricks. The final Preferred Alternative is expected to result in up to 489 wells (Table 4-5; Final Amended IAP/EIS). North Slope wells typically require 20 to 30 days of drilling, per well (Mark Major, ConocoPhillips Alaska Inc., pers. comm.).

The following estimate is based on the development scenario provided in the Final Amended IAP/EIS for the final Preferred Alternative. This scenario is based on existing knowledge of geologic potential and current exploration and development practices. Under the Final Preferred Alternative, the plan area is estimated to contain 12 fields that are economically viable and could be developed from 13 production drill pads.

The development scenario assumes that a maximum of four exploration and delineation drill rigs would be available and working at the same time. Exploration and delineation of leaseable areas would take approximately 10 years. All exploration and delineation would take place during winter months (mid-December through early April; about 33 percent of the year). During the remaining portion of the year, the rigs would be cold-stacked with derricks lowered. Because of the short-winter season and distance from existing infrastructure, rigs would stacked at existing gravel pads or staging facilities and possibly multi-year ice pads within the Planning Area. The Camp Lonely, Inigok, and Umiat sites have been identified as potential staging areas that may be used for rig storage. The actual location of exploration and delineation would influence which area or method is used.

Based on the above assumption, the number of drilling rig years for the first years of exploration and delineation would be 13. 3 (four drilling rigs x 10 years x 0.33). All exploration is expected to occur during winter months when no listed eiders are present.

Once fields are discovered and "proved-up," which could happen at any time during exploration, the leaseholder would apply for a development permit. This permit would require National Environmental Policy Act and ESA compliance. This process, including surveys required by the ROPs and Stipulations in the Final Preferred

Alternative, could take a minimum of 3 years and up to 6 years or more. Once permitting was completed, site development and production drilling could begin. A maximum of eight production drilling rigs would be used during development. Production drilling could occur year-round. For safety, and due to space limitations on the pad, only one rig is used per pad. At a maximum estimate of 489 production and service wells, an average of approximately 38 wells/pad, and 20 to 30 days per well, it would take approximately 3 years to complete drilling on each pad. If all production began at the same time, an unlikely scenario, eight pads could be completed in 3 years with eight drilling rigs, and the remaining five could be completed with five drilling rigs in another 3 years.

Based on the above assumption, the number of drilling rig years for production would be 39 years [(eight drilling rigs x 3) + (five rigs x 3 years)]. All exploration is expected to occur during winter months when no listed eiders are present. Production drilling could occur year-round.

Exploration, permitting, and production are not expected to occur concurrently for all fields/pads. The timeline presented here would be affected by initial exploration activity, actual discoverable volume of recoverable oil, economics and emerging technologies. However, estimated rig-years are reasonable based on the development scenario for the final Preferred Alternative. Some fields may be proved-up prior to the end of estimated 10 year exploration period and production drilling completed before the end of total 22 year drilling period described above (10 years exploration drilling + 6 years permitting + 6 years production). Infrastructure development, economics, and permitting may result in some production drilling occurring outside the 22-year period. Again, the estimated number of rig years remains the same.

The estimated number of drilling rig days (4,890) is the total expected over the life of the project (10 to 20 years) and reflects the number of days drilling rigs would be active while eiders are on the North Slope. It is expected that no more than eight production drilling rigs would be used in the Planning Area in a given year. A typical rig derrick is approximately 18 feet wide by 12 feet deep at the base, 5 feet wide by 3 feet deep at the crown, and 150 feet tall. Thus eight drilling rig derricks would represent a very small portion of the 4.6 million-acre Planning Area, and render the probability for collision quite low.

### D.4.4.2 Production/Support Facilities

#### Onshore

Production and support facilities on gravel pads could also present a collision hazard to threatened eiders. Facilities are not expected to be located in inter-tidal or offshore areas, because surface occupancy would not be allowed within ¾ mile of shorelines (Lease Stipulation K-6), and thus would not affect migrating eiders in coastal areas. Human activity in the vicinity of facilities, such as vehicle and pedestrian traffic, could help to deter eiders from using habitats near these areas. Proper lighting, as required under ROP E-10, would be installed on buildings and towers, and could help to minimize eider collisions with facilities during periods of poor visibility.

Elevated pipelines could be located across numerous tundra habitats, and could pose a collision hazard to eiders, particularly during periods of low visibility or under foggy conditions. Under the development scenario, 225 miles of pipeline could be constructed. Because of their large size, pipelines would generally be visible to eiders; therefore, collisions with pipelines would be unlikely. If pipeline routes were sited to avoid spectacled and Steller's eider habitats, the potential for collisions with pipelines and support structures would be reduced.

Mortality of spectacled and Steller's eiders could result from road kills caused by collisions with vehicular traffic. Vehicular collision is the greatest source of bird mortality associated with TAPS, particularly along the Dalton Highway where dust shadows caused early green-up along the road that attracted birds (TAPSO 2001). The primary birds groups affected by vehicular collisions were grouse and passerines. Although the number of birds killed was not quantified, the level of mortality was probably low when compared to the size local populations. Levels of traffic (including vehicular traffic and machinery) in the Planning Area would be greatest during the winter construction period when eiders are not present. Activities during the summer and the production period would involve vehicular traffic for well monitoring and maintenance. During an oil production period with

continuing construction at the Alpine field in 2001, an average of 13 vehicles per hour passed the security check station between 6 a.m. and 6 p.m. during the latter half of June. Reduced speed limits along roads, particularly early in the season when eiders could be attracted to areas of early green-up near roads and pads, during periods of poor visibility, and during brood-rearing periods when flightless birds could cross gravel roads, would help to reduce the potential for eider collisions with vehicles.

### Intertidal/Offshore

There are few reports of collisions of eiders with marine vessel traffic. Lovvorn et al. (2003) salvaged three spectacled eiders that collided with a ship during predawn hours in the Bering Sea. Spectacled or Steller's eiders staging in the Beaufort Sea adjacent to the Planning Area could potentially collide with vessel traffic during mid-July to September. Inexperienced young-of-the-year, which may be at higher risk for collisions with vessels, may occupy these marine habitats during August and September. However, good visibility associated with the long hours of daylight during much of this period could reduce the potential for eider collisions with vessel traffic. In addition, the number of barges transiting these offshore waters would be low.

### Power/Communication Lines

The only elevated communication and power lines in the Planning Area would be those associated with the support structures for pipelines, which would present no more of a hazard to eiders than the pipeline itself. Other communication and power lines would be buried in access roads or suspended on VSMs to the extent practicable, and would present no additional hazard to eiders.

### Communication Towers

Each CPF would each have a communications tower of approximately 60 feet in height and supported by guy wires, which would present a collision risk for spectacled and Steller's eiders. Quakenbush and Snyder-Conn (1993) reported that a Steller's eider was apparently killed by collision with a tower near Nanvak Bay, and local residents on St. Lawrence Island have reported eider collisions with wires associated with the Federal Aviation Administration tower (Day et al. 2003). Anderson and Murphy (1988) reported locating the remains of 15 birds in 1986 and 16 birds in 1987 that had been killed as a result of collisions with the Lisburne development powerline in the Prudhoe Bay area. None of the birds was identified as a spectacled or Steller's eider, although one unidentified eider was reported, along with several other waterfowl species. Although elevated powerlines are not part of the development scenario for the Planning Area, the effects of bird collisions with powerlines would be similar to collisions with guy wires for communication towers. The potential for eider collisions with communication towers or associated guy wires would likely be less than the potential for collisions at the Lisburne powerline because of the reduced amount of exposed wire hazard at communication towers. It is likely that less than one spectacled or Steller's eider would collide annually with communication towers or associated guy wires. Required Operating Procedure E-11(c) would require support wires for communication towers to be clearly marked along their entire length to improve visibility for low flying birds.

Scattered instances of collisions of eiders with various types of vessels or structures have been reported. A low probability exists that spectacled or Steller's eiders would collide with drill rigs, towers, buildings, pipelines, or other structures. Most of these structures are large and visible, and eiders would likely be able to avoid collisions in most cases. Structures such as powerlines or guy wires that are less visible could present the greatest potential for eider mortality due to collision. No aboveground powerlines are proposed in the Planning Area under the development scenario; although guy wires could be used to support communication towers. Based on the low numbers of eider collisions with structures that have been reported, it is likely that less than one spectacled or Steller's eiders annually would collide with structures in the Planning Area. However, any collisions that did occur would likely result in eider mortality.

## D.4.5 Increased Predation

There is evidence that some predators may be attracted to anthropogenic sources of food or denning/nesting sites associated with oil field development (Eberhardt et al. 1982, 1983a, b; Garrott et al. 1983; Martin 1997a; Day 1998; Burgess 2000). Increased predation could impact threatened eiders. Potential predators of adult eiders and their eggs and young that could be attracted to anthropogenic sources of food or denning/nesting sites in the Planning Area include Arctic fox, red fox, grizzly bear, glaucous gull, and common raven. Jaegers might also prey on eider eggs and young, but would probably not be attracted by human activities associated with development.

Major negative impacts have occurred at the Howe Island brant and snow goose (*Chen caerulescens*) colony in the Sagavanirktok River Delta as a result of predation by common ravens, Arctic foxes, and grizzly bears (Johnson 2000). Arctic foxes and glaucous gulls are also predators of common eider and brant eggs and young on the barrier islands (Noel et al. 2002). Increased levels of predation as a result of elevated numbers of predators could impact nesting and brood-rearing spectacled and Steller's eiders.

In recent years, oil field operators have installed predator-proof dumpsters at camps and implemented new refuse handling techniques to minimize the attraction of predators to the North Slope Borough landfill and areas of oil field development. In addition, oil field workers undergo training to make them aware of the problems associated with feeding wildlife and of stipulations and ROPs designed to mitigate the effects of increased levels of predation. The numbers of foxes and most avian predators at the existing Alpine field did not appear to increase during construction of the project, with the exception of common ravens, which nested on buildings at the Alpine field (Johnson et al. 2003b). Required Operating Procedures A-1, A-2, and E-9 specify measures that would be implemented to prevent attraction of predators to anthropogenic sources of food and to prevent man-made structures from being used as nesting, denning, or shelter sites for predators at future developments. These ROPs should minimize or eliminate increased predation pressure associated with oil development and production activities in the Planning Area on threatened eiders and other tundra nesting birds.

### D.4.5.1 Increased Den/Nesting Sites

Foxes in the Prudhoe Bay area have used areas under buildings as den sites, and common ravens, which were infrequent visitors to the ACP prior to development, use buildings, towers, and other structures for nest sites (Johnson and Herter 1989). Common ravens began nesting on structures at the Alpine field shortly after its construction (Johnson et al. 2003b), and a raven nest was reported on a remote wellhead in the National Petroleum Reserve – Alaska. In addition, gyrfalcons have been reported nesting on pipelines (Ritchie 1991). Required Operating Procedure E-9 requires that the best available technology be used to prevent facilities from providing nesting, denning, or shelter sites for ravens, raptors, and foxes to mitigate the potential increases in predators attracted to developed areas. Mitigation measures at the Alpine field have been successful in preventing predator use of structures for denning sites; nonetheless, common ravens used structures at the Alpine field for nest sites (Johnson et al. 2003b).

### D.4.5.2 Increased Food

The availability of anthropogenic food sources, particularly during the winter, could increase winter survival of Arctic and red foxes and contribute to increases in the fox population. Anthropogenic sources of food at dumpsters and refuse sites could cause populations of foxes, gulls, and ravens to increase above natural levels. Increased predation pressure resulting from increases in the number of predators near camps could decrease the breeding success of local nesting eiders. Required Operating Procedures A-2 and E-9 would require measures be put in place to ensure that human-caused increases in predator populations did not occur in the Planning Area.

Predators, such as glaucous gulls and Arctic foxes, could be attracted to anthropogenic food sources associated with summer maintenance of stored exploratory drilling and seismic equipment. Garbage associated with winter exploration activities could also attract foxes and ravens. Garbage should not be a problem in the Planning Area because all garbage would be removed from activity sites and taken to approved North Slope Borough landfills.

Required Operating Procedures A-1 and A-2 would require proper handling and disposal of solid waste and garbage.

#### Additional Landfills

No additional landfill sites would be opened in the National Petroleum Reserve – Alaska. All garbage would be removed from development sites and transported to landfill sites currently in operation outside of the Planning Area.

#### Increased Garbage on the Tundra Resulting From Increased Access

State law and ROPs address waste handling procedures at all developments in the Planning Area. If carefully followed, these procedures should greatly decrease or eliminate garbage entering the tundra ecosystem. However, it is likely that some additional garbage may result from development in the Planning Area.

### D.4.5.3 Increased Anthropogenic Perch/Hunting Sites

Building, towers, pipelines, and other structures provide perching sites that may be used by avian predators such as raptors, jaegers, snowy owls, and glaucous gulls. These perches may have the potential to increase predator efficiency, which could impact spectacled or Steller's eiders. The potential for impacts from avian predators using man-made hunting perches to affect eiders would be greatest during the brood-rearing period when hens with broods are moving across tundra habitats.

## D.4.6 Oil Spills

Oil spills or leaks onto tundra or marine habitats could negatively impact spectacled or Steller's eiders in numerous ways. Oil can come in contact with and adhere to feathers, causing the feathers to lose their insulating capabilities and resulting in hypothermia (Patten et al. 1991). In aquatic habitats, where birds come in contact with water and require feather integrity to maintain water repellency and buoyancy, the consequences would be most severe. Birds can suffer toxic effects from ingestion of oil by consuming food contaminated by an oil spill or by preening oiled feathers (Hansen 1981). Oil that comes in contact with bird eggs can cause toxic effects to embryos (Patten and Patten 1979, Stickel and Dieter 1979). Oil could come in contact with eggs directly as a result of a spill, or indirectly from the oiled feathers of incubating adults. Oil can also contaminate food sources.

### D.4.6.1 Terrestrial

Oil spills or leaks from a pipeline located in terrestrial habitats would be confined by topographical features. Spilled oil could also enter a lake or pond and be contained by the banks of these water bodies. McDonald et al. (2002) developed terrestrial and aquatic risk assessments for spectacled eiders based on a spill scenario constructed to mimic a spill entering and spreading across an entire lake to cover 1,134 acres, and a second spill scenario constructed to mimic a spill spraying onto the surrounding tundra and covering an area of 146 acres. Based on the assumptions of these scenarios, a maximum of 2.5 spectacled eiders would be exposed to oil from the aquatic spill, and 0.3 spectacled eiders would be exposed to oil from the terrestrial spill in the Colville, Kuparuk, and Prudhoe Bay areas. Assuming densities of 2.85 spectacled eiders per $mi^2$ (1.10 birds per $km^2$), 5 and 0.6 spectacled eiders could be affected by these aquatic and terrestrial spills, respectively. Steller's eiders occur in much lower densities in the Planning Area than spectacled eiders; therefore an oil spill in the Planning Area would likely impact fewer Steller's eiders than spectacled eiders.

During spring flooding, an oil spill could spread to a much larger area, depending on the amount of oil spilled, the surface topography, and the extent and duration of flooding. Oil entering a river or stream could spread into delta or coastal areas, where impacts to birds would likely be more severe. The potential for an oil spill to enter major rivers or streams would be minimized by lease stipulation K-1, which would provide setbacks of ½ to 1 mile from

specified rivers within which permanent oil and gas facilities, including gravel pads, roads, and airstrips would be prohibited. On a case-by case basis, and in consultation with federal, state, and NSB regulatory and resource agencies (as appropriate, based on agency legal authority and jurisdictional responsibility), essential pipeline and road crossings may be permitted through setback areas.

#### D.4.6.2 Riverine/Intertidal

A small spill entering a riverine or intertidal area would be diluted and would be unlikely to affect threatened eiders. Larger spills would have the potential to spread to intertidal or offshore areas where staging eiders could be affected. The greatest potential for impacts to eiders would occur during the fall staging period when eider flocks are molting. The average flock size reported during aerial surveys in the offshore waters of Harrison Bay was 21 (Fischer et al 2002). An oil spill would be unlikely to contact eiders, given the low density of spectacled eiders in offshore waters; however, a spill that did contact spectacled eiders could impact 20 or more birds.

#### D.4.6.3 Offshore

In marine habitats or on Teshekpuk Lake, wind and currents could potentially spread an oil spill over a larger area than would be likely under most terrestrial scenarios. Therefore, birds residing in marine habitats or on Teshekpuk Lake could be particularly at risk for negative impacts from an oil spill. Offshore development is not proposed for the Planning Area; however, a potential spill from an onshore source or from an offshore tanker or barge could result in oiling of marine waters. An oil spill occurring during the summer breeding and staging seasons would have a greater impact on threatened eiders than a spill occurring during the winter, when eiders are on wintering grounds. An oil spill that spread into offshore waters of Harrison Bay during the fall molting/staging period would have the potential to affect a greater number of spectacled eiders than a nearshore spill (Fischer et al. 2002). Stehn and Platte (2000) developed an oil spill scenario for the central Beaufort Sea based on a spill size of 5,912 bbl. When taking spectacled eider densities in the Beaufort Sea into consideration, the highest mean number of spectacled eiders exposed to oil was two birds. However, since there is some evidence that spectacled eiders may occur in flocks in offshore Beaufort Sea habitats (Fischer et al. 2002), an offshore spill could potentially impact more birds than the number proposed in the analysis of Stehn and Platte (2000). Lingering effects from a winter spill could impact birds returning during the following breeding season if clean-up activities did not adequately remove contaminants from bird habitats and food sources.

### D.4.7 Increased Subsistence Hunting

#### D.4.7.1 Birds Hunted in Previously Inaccessible Areas

Subsistence hunting and egg collecting activities could affect spectacled and Steller's eiders. The numbers of eiders and other bird species reported in subsistence harvest surveys conducted by the USFWS in various areas of Alaska can be found on their website (http://alaskafws.gov/ambcc/index.htm). Data in the reports include both numbers of birds and eggs harvested. The numbers of spectacled and Steller's eiders in the harvest surveys are reported for the Y-K Delta, the Bristol Bay area, St. Lawrence Island, the Bering Strait area, and the northwest Arctic Region. Little current information on subsistence harvest of spectacled or Steller's eiders from most areas on the North Slope is available (Wentworth 2004); SRBA and ISER (1993) reported one spectacled eider and three Steller's eiders were harvested annually from the Barrow area from April 1987 through March 1990. The actual numbers are probably higher because the average annual harvest for eiders unidentified to species was 5,982, some of which may have been spectacled or Steller's eiders. In the Planning Area, some level of subsistence hunting of eiders probably occurs in the Nuiqsut area.

Nuiqsut and Umiat are the only communities located within the Planning Area, although hunters from Barrow and some other villages also use areas around Teshekpuk Lake for subsistence activities. Increased access of the Planning Area road system by subsistence hunters could result if the road system were accessible by ATV trails near Nuiqsut or Umiat, or if ATVs could be transported by boat to the road system at locations along river systems.

Motorized access to oil field infrastructure could open a much larger area to subsistence hunting than the area currently available. However, unless future roads or other means of access from villages to infrastructure in the Planning Area were developed, it is unlikely that the proposed development would increase access to subsistence hunters in the Planning Area. In addition, subsistence hunters often avoid developed areas for subsistence hunting. Therefore, increased subsistence hunting pressure on spectacled and Steller's eiders would be unlikely to result from the final Preferred Alternative.

#### D.4.7.2 Lead Shot Accumulation Over a Greater Area

Lead poisoning has been reported as a source of spectacled eider mortality in the Y-K Delta that may have implications on a population level (Franson et al. 1995; Flint et al. 1997; Flint and Grand 1997; Grand et al. 1998). Lead shot used for hunting accumulates in wetland sediments used as feeding habitat by eiders and other waterfowl. Lead poisoning occurs primarily via ingestion of spent lead shot, which may remain available for consumption by eiders and other waterfowl for many years because of its low settlement rate (Flint 1998). Fewer studies have been conducted on the ACP; however, blood samples from nesting female Steller's eiders at Barrow in 1999 and 2000 all had concentrations exceeding the clinical level for lead exposure (USDOI USFWS 2002). If the source of the lead is on the breeding grounds, levels of exposure would be expected to increase for adults and young during the course of the breeding season (Flint et al. 1997).

The use of lead shot is currently illegal for hunting waterfowl, but is legal for hunting upland game birds such as ptarmigan. Lead shot used legally to hunt upland game birds could enter eider foraging habitats located adjacent to upland areas. Additionally, lead shot could also enter eider foraging habitats if used illegally to hunt waterfowl. Increased access to subsistence hunting areas in the Planning Area could increase the potential for both legal and illegal accumulation of lead shot in spectacled and Steller's eider habitats. High priority recovery tasks proposed by the Steller's Eider Recovery Team include monitoring of lead exposure levels throughout the species' range, and banning the use of lead shot for upland game birds in wetland environments (Swem 2004).

### D.4.8 Toxics

Organic pollutants and metals can be found in various types of environments throughout the world. The availability of these contaminants and their effects on waterfowl are becoming popular topics of study for researchers (e.g., Franson et al. 1995; Henny et al. 1995, 1998; Stout 1998; Trust et al. 2000; Stout et al. 2002; Grand et al. 2002). Contaminants that are sometimes spilled during oil and gas exploration and development activities include drilling mud, waste water, used crankcase oil, dust-control chemicals, reserve pit fluids, diesel fuel, glycol, crude oil, and salt water (Walker 1996). Current policies in North Slope oil fields require that any spills of toxic materials, including small quantities of material, be reported and cleaned up as soon as possible. In addition, current and future development practices have eliminated hazardous reserve pits that may have been a source of contaminants for threatened eiders.

### D.4.9 Mitigating Measures

Implementation of stipulations and ROPs (selected and abbreviated from the list of Final Preferred Alternative stipulations and ROPs presented in Table 2-2 of the Final Amended IAP/EIS) could conserve important eider habitats, decreasing the probability of disturbance or displacement of eiders. The two following mitigation measures are specifically directed toward avoiding listed eiders, as much as possible, during the placement of oil facilities:

- Aerial surveys for breeding pairs would occur in areas proposed for development, and consultation with USFWS and BLM concerning the design and location of structures would be required before approval of any construction, if listed eiders were present in such areas (ROP E-11); and

- An ecological land classification map would be developed for use in siting facilities, with the intent of moving the proposed location of facilities, to the extent possible, away from habitat types of greater importance for listed eiders to those of lesser importance (ROP E-12).

The following seven mitigation measures are directed toward protection of fisheries, lake-dwelling waterbirds, raptor nesting areas, and human subsistence activities. Nonetheless, they could benefit listed eiders if eider habitat were to occur within the prescribed setbacks and No Surface Occupancy areas:

- Approval for location of permanent oil and gas facilities within 500 feet (150 meters) of fish-bearing waterbodies or within 100 feet (30 meters) of non-fish-bearing water bodies would be restricted to those facilities that are likely to cause minimal impacts to wildlife (Lease Stipulation E-2);
- Permanent oil and gas facilities would be prohibited within setback zones of ½ to 1 mile of listed waterways (Lease Stipulation K-1);
- Permanent oil and gas facilities would be prohibited within ¼ mile of deepwater lakes with depths greater than 13 feet (4 meters; Lease Stipulation K-2);
- Within the Goose Molting Area no permanent oil and gas facilities, except for pipelines, would be allowed on the approximately 216,000 acres shown on Map 2-4. No exceptions would be considered (Lease Stipulation K-4);
- Within the Caribou Movement Corridor, no permanent oil and gas facilities, including pipelines, would be allowed on the approximately 16,000 acres shown on Map 2-4 (Lease Stipulation K-9);
- Within the Southern Caribou Calving Area, no permanent oil and gas facilities, excluding pipelines, would be allowed on the approximately 141,000 acres shown on Map 2-4 (Lease Stipulation K-10); and
- Surface disturbance would be limited to 300 acres within each of seven lease tracts shown on Map 2-4; this does not include surface disturbance activities from pipeline construction (No Exceptions; Lease Stipulation K-11).

These mitigation measures are intended to benefit wildlife and fisheries in general, and so would provide some benefit to listed eiders as well:

- The facility footprint would be minimized and air traffic would be reduced (ROP E-5);
- Facilities would be prevented from providing nesting, denning, or shelter sites for ravens, raptors, and foxes (ROP E-9);
- Lighting would be provided on structures exceeding 20 feet (6 meters) in height to prevent migrating waterfowl, including threatened eiders, from striking oil and gas related facilities during low light conditions (ROP E-10);
- All personnel would be provided with information about applicable ROPs and stipulations, and the importance of not disturbing biological resources, habitats, and bird colonies (ROP I-1); and
- Permanent oil and gas facilities would be prohibited within ¾ mile of the coast, to the extent practicable (Lease Stipulation K-6).

### D.4.10 Effects of Abandonment

Abandonment and reclamation of satellite fields would likely coincide with abandonment and reclamation of corresponding CPFs. Abandonment operations would entail removing all equipment, cutting well casings a minimum of 3 feet below the surface, and plugging wells. Gravel, or gravel/sand pads would not be removed, but allowed to bed naturally. Overall, abandonment operations would take many years, as revegetation and environmental monitoring studies would continue to document the long-term effects of operations at a particular site. A series of permitting and inspection activities would be associated with abandonment procedures (Stipulation

G-1). Abandonment activities would occur during winter months, when ice roads could be constructed to allow the removal of equipment. Abandonment monitoring would require periodic revisits to gather information on environmental parameters related to natural bedding and to document the success of abandonment actions. Normally, one helicopter with a crew of three would visit the sites annually for the first 5 years, followed by visits with increasing time gaps over the next 10 years. Each site visit would last a maximum of 1 day per visit, and there would be a maximum of 1 visit per year. It is expected that effects from abandonment would be negligible, because the pads would have been in place for nearly 3 decades, and eiders would have relocated to more suitable habitat.

### D.4.11 Protection Recommendations

Protection recommendations are addressed in Section 4.2.2.5 (Spill Prevention and Response).

## D.5 Cumulative Effects on Spectacled and Steller's Eiders

Since 1965, approximately 9.7 million acres of North Slope/Beaufort Sea acreage have been leased through 32 state sales, including many combined sales. In the past 10 years, the State of Alaska has conducted 12 lease sales in this area, leasing approximately 4.5 million acres. The State of Alaska has conducted annual area-wide sales in the Beaufort Sea and on the North Slope since 1995. Each Beaufort Sea offering would extend from Barrow to the Canadian border, while onshore sales would offer all unleased state lands between the Arctic National Wildlife Refuge and the National Petroleum Reserve – Alaska. The most recent sales were held in October 2004.

There currently are 25 producing oil fields on the North Slope, with Prudhoe Bay, North Prudhoe Bay, Kuparuk River, Alpine field, Milne Point, and Endicott being the most productive. The Alpine field, which began producing on the Colville River Delta in 2000, is the closest that oil field infrastructure has come to the Planning Area. Plans to construct satellite developments associated with the Alpine field in the eastern portion of the Planning Area are being prepared, and construction would likely begin within the next 1 to 2 years.

Cumulative effects are defined in 50 CFR § 402.02 (Interagency Cooperation on the Endangered Species Act of 1973, as amended) as "…those effects of future state or private activities not involving federal activities that are reasonably certain to occur within the action area of the federal action subject to consultation." The cumulative effects described in this section relate to potential effects to spectacled and Steller's eiders that may result from state or private actions reasonably certain to occur within or near the Planning Area. These actions can include subsistence harvest activities, commercial fishing activities, and recreational activities. The potential for construction of a road from Nuiqsut to existing infrastructure in the Prudhoe Bay oil field could also affect spectacled or Steller's eiders on State lands.

### D.5.1 Potential Effects to Subsistence Harvest

Subsistence harvesting of spectacled and Steller's eiders is estimated to remove hundreds of birds annually from the Alaskan breeding population (AMBCC 2003). Surveys conducted by the USFWS have reported numbers of birds and eggs harvested annually for western Alaska and the Bristol Bay area. No estimates of the numbers of spectacled and/or Steller's eiders harvested annually are available for most areas of the North Slope. Stephen R. Braund Associates and ISER (1993) reported that a few spectacled and Steller's eiders were harvested in the Barrow area from 1987 to 1990, but most harvested eiders were not identified to species. Likewise, no recent information is available on the numbers of spectacled or Steller's eiders that may be harvested by residents of Nuiqsut.

Under the development scenario for the Final Preferred Alternative, no roads connecting development infrastructure to Nuiqsut or other North Slope villages would be constructed. Thus, the proposed development would be unlikely to increase access to subsistence hunters in the Planning Area. However, the potential construction of a road from Nuiqsut to existing infrastructure in the Prudhoe Bay oil field could increase access to spectacled and Steller's eider habitats for subsistence hunters at the eastern edge of the Planning Area and adjacent

lands to the east. This increased access could result in a greater level of eider mortality, and could increase the potential for contamination of eider habitats with lead shot.

### D.5.2 Potential Effects to Commercial Fishing

A small commercial fishery is located in the Colville River Delta, where fishing activities occur at numerous scattered locations. Commercial fishing activities are conducted under the ice during the winter when eiders are not present on the ACP. The commercial fishery would not be expected to have any additional increased negative impact to spectacled or Steller's eiders.

### D.5.3 Recreational Activities

A small amount of recreational activity could occur within or adjacent to the Planning Area. Approximately eight summer float trips are expected to occur annually on the Colville River, typically with four persons per party. Recreational activity on the Colville River near the coast, where spectacled eider densities are greatest, is expected to be less than activity further up river. Float trip traffic would generally pass through most areas without causing significant disturbance to spectacled or Steller's eiders. Float trip groups that stop at campsites along the river for overnight camping could cause disturbance to eiders and result in temporary or permanent displacement from preferred feeding, nesting, or brood-rearing habitats. Based on the low densities of eiders in the Planning Area and adjacent lands, and on the relatively small number and size of float groups expected annually, the impacts of recreational activities would not be likely to affect more than a few spectacled or Steller's eiders.

### D.5.4 Nuiqsut Road Construction

The State of Alaska, Department of Transportation is considering the possibility of a new road that would be constructed from Nuiqsut to existing roads in the Prudhoe Bay oil field. Road construction could cause permanent and temporary habitat loss or alteration on state lands along and adjacent to the footprint of the road, which could affect spectacled and Steller's eider habitats. The effects of habitat loss would be the same as those discussed for gravel roads and pits in the Planning Area. Disturbance from vehicular or pedestrian traffic along the road could also cause permanent or temporary displacement of eiders from preferred habitats near the road, which could in turn disrupt feeding behavior and affect energy budgets, cause permanent or temporary nest abandonment, or cause behavioral disturbance to brood-rearing groups. Vehicular traffic on the Nuiqsut road could increase the potential for eider mortality due to collisions with vehicles, particularly during the spring when eiders may be attracted to areas near the road where habitats are open early in the season. A road from Nuiqsut to roads in the Prudhoe Bay oil field could increase access by subsistence hunters, which could result in increased eider mortality due to subsistence hunting. In addition, increased contamination of eider feeding habitats could potentially result from the use of lead shot, which could also impact survival of individual eiders.

## D.6 Agency Determination

In accordance with Section 7(a)(2), Endangered Species Act of 1973, as amended (16 USC 1531 et seq.), the BLM's action of amending the Northeast National Petroleum Reserve – Alaska IAP/EIS **may affect and is likely to adversely affect** the listed spectacled and Steller's eiders within the Planning Area. Using conservative (high) estimates of eider density, approximately 84 spectacled eiders and 5 Steller's eiders (assuming impacts occur to eiders within 200 meters of zone of influence) could be impacted over the life span of the reasonably foreseeable development activities analyzed by the Amended IAP/EIS. Required Operating Procedures and stipulations are expected to substantially reduce the number of eiders expected to be impacted. No designated Critical Habitat for either species occurs within the Planning Area, thus no adverse modification would occur.

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# APPENDIX E

# STIPULATIONS FROM THE 1998 NORTHEAST NATIONAL PETROLEUM RESERVE – ALASKA RECORD OF DECISION

# APPENDIX E

# STIPULATIONS FROM THE 1998 NORTHEAST NATIONAL PETROLEUM RESERVE – ALASKA RECORD OF DECISION

**Exception Clause:** In the event that an exception to a lease or permit stipulation is requested, and before an exception may be granted, the Authorized Officer (AO) shall find that implementation of the stipulation is:

1. a) technically not feasible, or
   b) economically prohibitive, or
   c) an environmentally preferable alternative is available, and

2. the alternative means proposed by the lessee fully satisfies the objective(s) of the stipulation.

In addition, prior to the consideration or granting of an exception to a lease or permit stipulation, all conditions and/or consultation requirements specific to a stipulation must be met. The AO shall consult with appropriate federal, state, and North Slope Borough (NSB) regulatory and resource agencies before an exception may be granted, except in the case of an emergency. The AO's power to grant stipulation exceptions is limited to those subjects, uses, and permits over which the Bureau of Land Management (BLM) has authority. Exceptions may be granted in emergencies involving human health and safety.

**Waste Prevention, Handling, and Disposal and Spills:**

1. To prevent and minimize present and future pollution, management decisions affecting waste generation shall be addressed in the following order of priority:

   -Prevention and Reduction
   -Recycling
   -Treatment
   -Disposal

   a. Lessees shall prepare a waste-management plan approved by the AO, in consultation with appropriate federal, state, and NSB regulatory and resource agencies, to achieve specific waste-reduction and prevention goals for all phases of exploration and development (including activities conducted by contractors). The plan shall identify all waste streams that will be produced during each operation by type, volume, and toxicity and the method of disposal. For each waste stream, the lessee/operator shall describe what actions will be taken to minimize the volume. The plan should include activities that will integrate pollution prevention concepts into purchasing, inventory, shipping/receiving, operations maintenance, training, accounting, and design. The goal of the plan shall be continuous environmental improvement and achievement of reduction goals developed through the planning process. Lessees shall develop schedules for implementation and review to meet reduction and prevention goals, designate accountable personnel to carry out action items, and specify budget line items for plan elements. Lessees shall provide the AO with an annual waste-management report.

   b. Lessees shall implement a hazardous-materials tracking system to ensure proper use, storage, and management of materials being used within industrial processes. The use of chlorinated solvents is prohibited.

c. Lessees shall conduct annual environmental compliance audits.

2. Attracting wildlife to food and garbage is prohibited. All feasible precautions shall be taken to avoid attracting wildlife to food and garbage. A current list of approved precautions, specific to type of permitted use, can be obtained from the AO. Lessees and permitted users shall have a written procedure to ensure that the handling and disposal of putrescible waste will be accomplished in a manner to prevent the attraction of wildlife.

3. Burial of garbage is prohibited. All putrescible waste shall be incinerated or composted through an AO-approved system, unless otherwise authorized by the AO. All solid waste, including incinerator ash, shall be removed from BLM lands and disposed of in an approved waste-disposal facility in accordance with U.S. Environmental Protection Agency (USEPA) and State of Alaska Department of Environmental Conservation (ADEC) regulations and procedures. Burial of human waste is prohibited except as authorized by the AO.

4. Except as specifically provided, all pumpable solid, liquid, and sludge waste shall be disposed of by injection in accordance with USEPA, ADEC, and the Alaska Oil and Gas Conservation Commission regulations and procedures. On-pad temporary muds and cuttings storage will be allowed as necessary to facilitate annular injection and/or backhaul operations.

5. Wastewater disposal:

a. Unless authorized by the National Pollution Discharge Elimination System (NPDES) or state permit, disposal of domestic wastewater into bodies of freshwater, including wetlands, is prohibited.

b. Surface discharge of reserve-pit fluids is prohibited unless authorized by applicable NPDES, ADEC, and NSB permits and approved by the AO.

c. Disposal of produced waters in upland areas, including wetlands, will be by subsurface-disposal techniques. The AO, in consultation with the ADEC and USEPA, may permit alternate disposal methods, if the lessee demonstrates that subsurface disposal is not feasible or prudent.

d. Discharge of produced waters into open or ice-covered marine waters less than 33 feet (10 meters) in depth is prohibited. The AO in consultation with ADEC and USEPA may approve discharges into waters greater than 33 feet (10 meters) in depth based on a case-by-case review of environmental factors and consistency with the conditions of a NPDES permit.

e. Alternate disposal methods will require an NPDES permit certified by the State.

6. Areas of operation shall be left clean of all debris.

7. All spills shall be cleaned up immediately and to the satisfaction of the AO and all agencies with regulatory authority over spills, including the USEPA, ADEC, and the U.S. Coast Guard.

8. Notice of any spill shall be given to the AO as soon as possible. Other federal, state, and NSB entities shall be notified as required by law.

9. For oil and gas-related activities, a Hazardous Materials Emergency Contingency Plan shall be prepared and implemented prior to transportation, storage, or use of fuel. The plan shall include a set of procedures to ensure prompt response, notification, and cleanup in the event of a hazardous substance spill or threat of a release. Procedures applicable to fuel handling (associated with transportation vehicles) may consist of Best Management Practices (BMPs) approved by the AO. The plan shall include a list of resources

available for response (e.g., heavy-equipment operators, spill-cleanup materials or companies), and names and phone numbers of federal, state, and NSB contacts. Other federal and state regulations may apply and require additional planning requirements. All staff shall be instructed regarding these procedures.

10. Oil-spill-cleanup materials (absorbents, containment devices, etc.) shall be stored at all fueling points and vehicle-maintenance areas and be carried by field crews on all overland moves, seismic work trains, and similar overland moves by heavy equipment.

11. Lessees shall provide refresher spill-response training to NSB and local community spill-response teams on a yearly basis.

12. Lessees shall plan and conduct a major spill-response field-deployment drill annually.

13. Prior to production and as required by law, lessees shall develop spill prevention and response contingency plans and participate in development and maintenance of the *North Slope Subarea Contingency Plan for Oil and Hazardous Substances Discharges/Releases* for the National Petroleum Reserve – Alaska operating area. Planning shall include development and funding of detailed (e.g., 1:26,000 scale) environmental sensitivity index maps for the lessee's operating area and areas outside the lessee's operating area that could be affected by their activities. (The specific area to be mapped shall be defined in the lease agreement and approved by the AO in consultation with appropriate resource agencies.) Maps shall be completed in paper copy and geographic information system format in conformance with the latest version of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration's *Environmental Sensitivity Index Guidelines*. Draft and final products shall be peer reviewed and approved by the AO in consultation with appropriate federal, state, and NSB resource and regulatory agencies.

14. Except during overland moves and seismic operations (see Stipulation 24[m]), fuel, other petroleum products, and other liquid chemicals designated by the AO, whether in excess of 660 gallons in a single tank or in excess of 1,320 gallons in multiple containers, shall be stored within an impermeable lined and diked area capable of containing 110 percent of the stored volume. The liner material shall be compatible with the stored product and capable of remaining impermeable during typical weather extremes expected throughout the storage period. Permanent fueling stations shall be lined or have impermeable protection to prevent fuel migration to the environment due to overfills and spills. The storage area shall be located at least 500 feet from any waterbody with the exception of small caches (up to 210 gallons) for motor boats, float planes, and ski planes.

15. Fuels shall not be stored on the active floodplain of any waterbody. Although fuels may be off-loaded from aircraft on ice, fuels shall not be stored on lake or river ice.

16. Refueling of equipment within 500 feet of the highest high water mark of any waterbody is prohibited with the exception of refueling motor boats, float planes, and ski planes. See Stipulation 24[n] for restrictions related to overland moves and seismic operations.

17. All fuel containers, including barrels and propane tanks, shall be marked with the responsible party's name, product type, and year filled or purchased.

**Ice Roads and Water Use:**

18. The location of winter ice roads shall be offset from year to year to minimize vegetative impacts. The offset shall be greater than or equal to the width of the road.

19. Compaction of snow cover or snow removal from fish-bearing waterbodies shall be prohibited except at approved ice-road crossings.

20. Water withdrawal from rivers and streams during winter is prohibited. Water withdrawal is prohibited during winter from lakes less than 7 feet (2.1 meters) deep if they are interconnected with or subject to seasonal flooding by a fish-bearing stream. Water may be withdrawn from isolated lakes that are less than 7 feet (2.1 meters) deep that lack connection to or are not subject to seasonal flooding by a fish-bearing stream. After consultation with the appropriate federal, state, and NSB regulatory and resource agencies, the AO may authorize withdrawals from any lake less than 7 feet (2.1 meters) deep, if the proponent demonstrates that no fish exist in the lake.

    Generally, water withdrawal drawdown during winter from lakes 7 feet (2.1 meters) deep or deeper shall be limited to 15 percent of the estimated free-water volume (i.e., excluding the ice). After consultation with the appropriate federal, state, and NSB regulatory and resource agencies, the AO may authorize drawdown exceeding 15 percent from a lake greater than 7 feet (2.1 meters) deep, if the proponent of the additional drawdown demonstrates that no fish exist in the lake. Operators are encouraged to use new ice-road and ice-pad construction methods, such as using aggregate "chips" shaved from frozen lakes, to decrease water demands, construction time, and impact on fisheries.

21. The AO, in consultation with appropriate federal, state, and NSB regulatory and resource agencies, may allow water extraction from any lake used by molting geese, if it is determined that the withdrawal is consistent with Stipulation 20 and will not adversely affect identified goose-feeding habitat along lakeshore margins. An analysis/demonstration of the hydrologic functions of the lake(s) under review may be required of the lessee by the AO prior to approval of the withdrawal.

22. Except for approved crossings, alteration of the banks of a waterway is prohibited. Waterways include natural features with sufficient water to create riparian (willow) habitat such as rivers, streams, deep and shallow lakes, tundra ponds, and shallow water tracks. Clearing of willows along the riparian zone is prohibited. Movement of equipment through willow stands shall be avoided whenever possible.

**Overland Moves and Seismic Work:**

23. Seismic work is prohibited within 1,200 feet of any known, long-term cabin or campsite, identified by the AO, without the written permission of the AO. The AO's decision will be informed by the consultation process described in Stipulation 61.

24. The following restrictions apply to overland moves, seismic work, and any similar use of heavy equipment (other than actual excavations as part of construction) on unroaded surfaces during the winter season:

    a. Because polar bears are known to den predominantly within 25 miles of the coast, operators shall consult with the U.S. Fish and Wildlife Service (USFWS) prior to initiating activities in such habitat between October 30 and April 15. Activities are prohibited within 1 mile of known or observed polar bear dens; obtain locations from the USFWS, (907) 786-3800. Operators are encouraged to apply for a letter of authorization from the USFWS to conduct activities in polar bear denning areas.

    b. Motorized ground-vehicle use will be minimized within the Colville River Raptor, Passerine, and Moose Area LUEA from April 15 through August 5, with the exception that use will be minimized in the vicinity of gyrfalcon nests beginning March 15. Such use will remain ½ mile away from known raptor-nesting sites, unless authorized by the AO. The BLM shall consult with the USFWS to plan travel routes to minimize disturbance to raptors.

    c. Crossing of waterway courses shall be made using a low-angle approach to avoid disruption of the natural stream or lake bank. Except at approved crossings, operators are encouraged to travel a minimum of 100 feet from overwintering fish streams and lakes.

d. If snow ramps or snow bridges are used at water crossings for bank protection, the ramps and bridges shall be substantially free of soil and/or debris. Snow bridges shall be removed or breached immediately after use or before spring breakup.

e. To avoid additional freeze down of deep-water pools harboring overwintering fish, waterways shall be crossed at shallow riffles from point bar to point bar whenever possible.

f. On-the-ground activities shall use low-ground-pressure vehicles such as Rolligons, ARDCO, Trackmaster, Nodwell, or similar types of vehicles. A current list of approved vehicles can be obtained from the AO. Limited use of tractors equipped with wide tracks or "shoes" will be allowed to pull trailers.

g. Bulldozing of tundra, trails, or seismic lines is prohibited. This stipulation, however, does not prohibit the clearing of drifted snow along a trail, seismic line, or in a camp, to the extent that the tundra mat is not disturbed. Snow may be cleared from a waterbody ice surface to prepare an aircraft runway, if approved by the AO in consultation with appropriate federal, state, and NSB regulatory and resource agencies.

h. To reduce the possibility of ruts, vehicles shall avoid using the same trails for multiple trips unless necessitated by serious safety or superseding environmental concern. This provision does not apply to ice roads (see Stipulation 18 above).

i. Ground operations are to begin only after the seasonal frost in the tundra and underlying mineral soils has reached a depth of 12 inches, and the average snow cover is 6 inches deep. The exact date shall be determined by the AO.

j. Ground operations shall cease when the spring melt of snow begins; approximately May 5 in the foothills area where elevations exceed 300 feet, and approximately May 15 in the northern coastal areas. The exact date will be determined by the AO.

k. Seismic activities and overland moves within the Goose Molting Land Use Emphasis Area (LUEA) and the Teshekpuk Lake Caribou Habitat LUEA from May 1 through September 30 are prohibited. (Note that this overrides language in Stipulation 24[j].)

l. To prevent surface disturbance to tundra and other vegetation, tracked vehicles will not execute tight turns by locking one track.

m. Operators shall use best available technology (e.g., self-contained containment systems) or other appropriate spill containment measures, approved by the AO, to prevent fuel migration from fuel or chemical storage areas to the environment due to overfills and spills.

n. Refueling of equipment is prohibited within the active floodplain of any waterbody.

**Oil and Gas Exploratory Drilling:**

25. From May 1 through September 30, exploratory drilling other than from production pads is prohibited in the Special Caribou Stipulations Area.

26. Exploratory drilling is prohibited within 1,200 feet of any known, long-term cabin or campsite, identified by the AO, without written permission of the AO. The AO's decision will be informed by the consultation process described in Stipulation 61.

27. Permanent or gravel oil and gas facilities including roads shall not be constructed during the exploration phase of oil and gas development.

28. Exploratory drilling in river, stream, and lake beds, as determined by the highest high water mark, is prohibited. Exceptions to this stipulation may be authorized by the AO in cases of shallow lakes which freeze to the bottom, do not support significant fish or bird populations, and are hydrologically isolated. Further, such an exception may be granted only if it is environmentally preferable to maintaining the restriction.

**Facility Design and Construction:**

29. At least 3 years prior to approval of any development plan for leases within the Special Caribou Stipulations Area, the lessee shall design and implement a study of caribou movement, including historical information regarding the distribution and range use of the Teshekpuk Lake Caribou Herd, as well as maps of caribou trails within the area. Study data may be gathered concurrent with approved seismic and exploration activity. The study design shall be approved by the AO in consultation with the Research and Monitoring Team. The study will include a minimum of 3 years of data to assist in providing the information necessary to determine facility design and location, including pipelines, which will be part of the development plan. Lessees may submit individual plans or they may combine with other lessees in the area to do a joint study. Total study funding by all lessees will not exceed $500,000.[1]

30. Causeways and docks are prohibited in river mouths or deltas. Artificial gravel islands and bottom-founded structures are prohibited in river mouths or active stream channels on river deltas, except as provided in the paragraphs below.

The BLM discourages the use of continuous-fill causeways. Environmentally preferred alternatives for field development include the use of onshore directional drilling, elevated structures, or buried pipelines. Approved causeways shall be designed, sited, and constructed to prevent significant changes to near shore oceanographic circulation patterns and water-quality characteristics (e.g., salinity, temperature, suspended sediments) that result in exceedences of water-quality criteria, and must maintain free passage of marine and anadromous fish.

Causeways, docks, artificial gravel islands, and bottom-founded structures may be permitted if the AO, in consultation with appropriate federal, state, and NSB regulatory and resource agencies, determines that a causeway or other structure is necessary for field development, and that no feasible and prudent alternative exists. A monitoring program may be required to address the objectives of water quality and free passage of fish. Additional mitigation shall be required where significant deviation from these objectives occurs.

31. Permanent oil and gas surface occupancy, including but not limited to permanent oil and gas facilities, pads, rigs, platforms, gravel roads, airstrips, pipelines, gravel or other material extraction sites, and exploration and delineation drilling facilities are prohibited in the Teshekpuk Lake Surface Protection Area (specifically, T. 13 N., Rs. 3-7 W., U.M.; Secs. 1-6, 8-16, 21-25, 36, T. 13 N., R. 8 W., U.M.; T. 14 N., Rs. 1-2 E. and Rs. 1-8 W., U.M.; Secs. 1-2, 11-14, T. 14 N., R. 9 W., U.M.; T. 15 N., Rs. 2-8 W., U.M.; Secs. 1-3, 7-30, 35-36, T. 15 N., R. 9 W., U.M.; T. 16 N., Rs. 2-8 W., U.M.; Secs. 1-6, 8-17, 21-27, 34-36, T. 16 N., R. 9 W., U.M.; T. 17 N., Rs. 1-9 W., U.M.; and T. 18 N., Rs. 2-8 W., U.M.). No exceptions will be granted to this stipulation.

32. Lessees shall use maximum economically feasible extended-reach drilling for production drilling to minimize the number of pads and the network of roads between pads. New developments shall share facilities with existing development when prudent and technically feasible. All oil and gas facilities,

[1] Due to the limited portion of the caribou LUEA that is available for oil and gas leasing, it is projected that the costs associated with such a study would be considerably less than the maximum identified.

except airstrips, docks, and seawater-treatment plants, will be collocated with drill pads. If possible, airstrips will be integrated with roads. Given the paucity of gravel sites in the Planning Area and the cost of transporting gravel from outside the Planning Area, lessees are encouraged to implement gravel-reduction technologies e.g., insulated or pile-supported pads.

33. Within the Special Caribou Stipulations Area, lessees shall orient linear corridors when laying out oil field developments to address migration and corralling effects and to avoid loops of road and/or pipeline that connect facilities.

34. Lessees shall separate elevated pipelines from roads by a minimum of 500 feet, if feasible. Separating roads from pipelines may not be feasible within narrow land corridors between lakes and where pipe and road converge on a drill pad.

35. To minimize delay or deflection of caribou movements, lessees shall place pipeline on the appropriate side of the road as determined by the AO (depending on general caribou movements in the area).

36. In the Special Caribou Stipulations Area and where facilities or terrain may funnel caribou movement, ramps over pipelines, buried pipe, or pipe buried under the road may be required by the AO after consultation with appropriate federal, state, and NSB regulatory and resource agencies.

37. Aboveground pipelines shall be elevated at least 5 feet, as measured from the ground to the bottom of the pipe, except where the pipeline intersects a road, pad, or a ramp installed to facilitate wildlife passage and subsistence passage and access. The AO, in consultation with appropriate federal, state, and NSB regulatory and resource agencies, may make an exception if no feasible and prudent means exists to meet the requirement.

38. All crude oil, produced water, seawater, and natural gas pipelines shall be constructed to accommodate the best available technology for detecting corrosion or mechanical defects during routine structural integrity inspections.

39. Permanent oil and gas facilities, including roads, airstrips, and pipelines, are prohibited within and adjacent to the waterbodies listed below at the distances identified to protect fish and raptor habitat, cultural and paleontological resources, and subsistence and other resource values. Setbacks include the bed of the waterbody and are measured from the bank's highest high water mark.

    a. **Ikpikpuk River**: a ½-mile setback from the bank of the Ikpikpuk River within the Planning Area (fish, raptors, subsistence, cultural, and paleontological resources).

    b. **Miguakiak River:** a ½-mile setback from each bank of the Miguakiak River (fish and subsistence resources).

    c. **Teshekpuk Lake:** a ½-mile setback from the bank and around the perimeter of Teshekpuk Lake (fish and subsistence resources).

    d. **Fish Creek:** 1) a 3-mile setback from each bank of Fish Creek downstream from Sec. 31, T. 11 N., R. 1 E.; 2) a ½-mile setback from each bank of Fish Creek in and upstream from Sec. 31, T. 11 N., R. 1 E., U.M. (fish and subsistence resources).

    e. **Judy Creek:** a ½-mile setback from each bank of Judy Creek extending from the mouth to the confluence of an unnamed tributary in Sec. 8, T. 8 N., R. 2 W., U.M. (fish and subsistence resources).

f. **Colville River:** a 1-mile setback from the western bluff (or bank if there is no bluff) of the Colville River extending the length of the river as described in the Colville River Raptor, Passerine, and Moose LUEA. This restriction does not apply within 1½ mile of the Umiat airstrip (fish, raptor, passerine, moose, paleontological, subsistence, scenic, and recreational resources).

g. **Deep Water Lakes:** a ¼-mile setback around the perimeter of any fish-bearing lake within or partially within the deep lake zone (fish resources). If the fish-bearing status of the waterbody is unknown, the burden is on the lessee to demonstrate whether fish are present.

h. **Kikiakrorak River:** a 1-mile setback from each bluff (or bank if there is no bluff) of the Kikiakrorak River downstream from T. 2 N., R. 4 W., U.M. (raptor, passerine, and moose resources).

i. **Kogosukruk River:** a 1-mile setback from each bluff (or bank if there is no bluff) of the Kogosukruk River (including the four tributaries off the southern bank) downstream from T. 2 N., R. 3 W., U.M. (raptor, passerine, and moose resources).

On a case-by-case basis, essential pipeline and road crossings will be permitted, in consultation with appropriate federal, state, and NSB regulatory and resource agencies, through setback areas in those instances where no other suitable sites are available. Stream crossings will be sited perpendicular to the main channel flow; lake crossings will be at the narrowest point. Pipeline and road crossings are prohibited in the setback around Teshekpuk Lake, with no exceptions. Road crossings are prohibited in the setback adjacent to the Colville River with no exceptions.

40. Gravel mining sites required for development activities will be restricted to the minimum necessary to develop the field efficiently and with minimal environmental damage. Where feasible and prudent, gravel sites shall be designed and constructed to function as water reservoirs for future use. Gravel mine sites are prohibited within the active floodplain of a river, stream, or lake unless the AO, in consultation with appropriate federal, state, and NSB regulatory and resource agencies, determines that there is no feasible and prudent alternative or that a floodplain site would enhance fish and wildlife habitat after mining operations are completed and the site is closed.

Mine site development and rehabilitation within a floodplain shall follow the procedures outlined in McLean (1993), *North Slope Gravel Pit Performance Guidelines*, Alaska Department of Fish and Game (ADFG), Habitat and Restoration Division, Technical Report 93-9.

41. For those waterbodies not listed in Stipulation 39, permanent oil and gas facilities, including roads, airstrips, and pipelines, are prohibited upon or within 500 feet as measured from the highest high water mark of the active floodplain. Essential pipeline and road crossings will be permitted on a case-by-case basis.

42. Bridges, rather than culverts, shall be used for any allowed road crossings on all major rivers, including those waterbodies listed in Stipulation 39 or identified by the AO in consultation with appropriate federal, state, and NSB regulatory and resource agencies, to reduce the potential of ice-jam flooding and erosion. When necessary on smaller streams, culverts shall be large enough to avoid restriction of fish passage or adversely affecting natural stream flow.

43. The natural drainage pattern will be identified prior to and maintained during and after construction. All permanent structures constructed adjacent to a body of water, such as approved road and pipeline crossings, shall be sited and designed to limit erosion from flooding and wave action (e.g., through use of slope-protection measures). Cross-drainage structures will be sited, maintained, and properly abandoned to prevent impoundments or alteration of local or areawide hydrology. Gravel structures shall be designed and sited to minimize the length that is perpendicular to sheet flow.

44. Dewatering during construction shall be conducted using BMPs. A current list of BMPs will be available from the AO. Examples include the use of splash plates, dewatering points, natural filtration through vegetation, and dewatering during low-water period.

45. No surface structures, except essential transportation crossings, are allowed within the Pik Dunes LUEA.

46. Lessees shall minimize the impact of industrial development on key wetlands. Key wetlands are those wetlands that are important to fish, waterfowl, and shorebirds because of their high value or scarcity in the region. Lessees shall identify on a map or aerial photograph the largest surface area, including future expansion areas, within which a facility is to be sited or an activity is to occur. The AO will consult with federal, state, and NSB regulatory and resource agencies to identify key wetlands and work with lessees during the development of operating plans. To minimize impact, the lessee shall avoid siting facilities in the identified wetlands, unless no feasible and prudent alternative exists. Key wetland types include but are not limited to fish-bearing lakes and streams, riparian shrub, and the following classes described by Bergman et al. (1977): shallow and deep-*Arctophila* ponds, deep-open lakes, basin-complex wetlands, and coastal wetlands.

47. Permanent oil and gas facilities are prohibited within 1 mile of known long-term cabins or long-term campsites, identified by the AO, except that pipelines and roads are allowed up to ¼ mile from such cabins or campsites. The AO's decision will be informed by the consultation process described in Stipulation 61.

48. Permanent roads (i.e., gravel, sand) connecting to a road system or docks outside the Planning Area are prohibited, and no exceptions may be granted. Permanent roads necessary to connect pads within independent, remote oil fields are allowed but they must be designed and constructed to create minimal environmental impacts. Roads connecting production sites between separate oil fields may be considered if road-connected operations are environmentally preferable to independent, consolidated operations that each include airstrip, housing, production, and support facilities. This exception will only be granted following consultations with appropriate federal, state, and NSB regulatory and resources agencies, and the appropriate level of National Environment Policy Act (NEPA) review.

**Ground Transportation:**

49. The following ground-traffic restrictions apply to permanent roads (as authorized in Stipulation 48 above) in the Special Caribou Stipulations Area:

a. From May 20 through June 20:

(1) Traffic speed will not exceed 15 miles per hour.
(2) Traffic will be minimized (a reasonable target would be four convoy round-trips per day between facilities). Nonessential operations requiring vehicles shall be suspended during this time period.

a. From May 20 through August 1:

(1) Caribou movement will be monitored.
(2) Based on this monitoring, traffic will cease when a crossing by 10 or more caribou appears to be imminent.

c. From May 20 through August 20:

(1) Convoying will be used to minimize the number of disturbances due to road traffic.
(2) Personnel will be bussed between work sites and other facilities to minimize the number of vehicles on the road.

50. Major stockpiling of equipment, materials, and supplies for oil and gas activities in the Special Caribou Stipulations Area shall occur prior to or after the period May 20 through June 20 to minimize road traffic during that period.

51. Chasing wildlife with ground vehicles is prohibited.

**Air Traffic:**

(Note: The BLM's authority to restrict air traffic is limited to those activities associated with use authorization on BLM-administered lands.)

52. Use of aircraft larger than a Twin Otter for authorized activities in the Planning Area, including oil and gas activities, from May 20 through August 20 within the Teshekpuk Lake Caribou LUEA is prohibited, except in cases of emergency.

53. Helicopter overflights for BLM-permitted activities shall be suspended in the Goose Molting LUEA from June 15 through August 20.

54. Fixed-wing aircraft traffic takeoffs and landing for BLM-permitted activities in the Planning Area shall be limited to an average of one round-trip flight a day from May 20 through June 20 at aircraft facilities in the Teshekpuk Lake Caribou Habitat LUEA. Within the Goose Molting LUEA, fixed-wing aircraft use for such activities shall be restricted from June 15 to August 20 to flight corridors and frequencies established by BLM in consultation with the appropriate federal, state, and NSB regulatory and resource agencies.

55. Aircraft shall maintain an altitude of at least 1,000 feet above ground level (AGL) (except for takeoffs and landings) over caribou winter ranges from October 1 through May 15 and 2,000 feet AGL over the Teshekpuk Lake Caribou Habitat LUEA from May 16 through July 31, unless doing so would endanger human life or violate safe flying practices.

56. Aircraft shall maintain an altitude of at least 1,500 feet AGL when within ½ mile of cliffs identified as raptor nesting sites from April 15 through August 5, unless doing so would endanger human life or violate safe flying practices. Aircraft shall maintain an altitude of 1,500 feet AGL when within ½ mile of known gyrfalcon nest sites from March 15 to April 15. Permittees shall obtain information from the BLM necessary to plan flight routes near gyrfalcon nests.

57. Hazing of wildlife by aircraft is prohibited.

**Oil Field Abandonment:**

58. Upon field abandonment or expiration of a lease or oil and gas-related permit, all facilities shall be removed and sites rehabilitated to the satisfaction of the AO, in consultation with appropriate federal, state, and NSB regulatory and resource agencies. The AO may determine that it is in the best interest of the public to retain some or all of the facilities. Lessees shall comply with all exploration and development bonding required by law and regulation (43 CFR § 3154.1 and 3134.1). No exceptions shall be granted to this provision.

**Subsistence:**

59. During exploration, development, and production, the lessee shall develop and implement a plan, approved by the AO in consultation with the Research and Monitoring Team and the Subsistence Advisory Panel, to monitor the effects of activities on subsistence. The lessee shall provide biannual reports to the BLM, the Research and Monitoring Team, and the Subsistence Advisory Panel.

60. Lessees shall not unreasonably restrict access by subsistence users in oil field development areas.

a. Lessees shall establish procedures for entrance to facilities, the use of roads, and firearms discharge. These procedures shall be developed in consultation with affected local communities, NSB, and the Subsistence Advisory Panel and be approved by the AO. In cases where the lessee and the Panel disagree, the AO will determine the appropriate procedure.

b. Lessees shall develop and distribute information about how to conduct subsistence activities in development areas safely (so equipment is not damaged and people are not endangered) to the communities through public meetings, newsletters, radio, and signs in both English and Iñupiaq.

61. Exploration and development and production operations shall be conducted in a manner that prevents unreasonable conflicts between the oil and gas industry and subsistence activities.

Prior to submitting an exploration plan or development and production plan (including associated oil-spill contingency plans) to the BLM, the lessee shall consult with potentially affected subsistence communities (e.g., Barrow, Nuiqsut, Atqasuk, or Anaktuvuk Pass), NSB, and the Subsistence Advisory Panel to discuss potential conflicts with the siting, timing, and methods of proposed operations and safeguards or mitigating measures that could be implemented by the operator to prevent unreasonable conflicts. Through this consultation, the lessee shall make every reasonable effort, including such mechanisms as a conflict avoidance agreement, to ensure that exploration, development, and production activities are compatible with subsistence hunting, fishing, and other subsistence activities and will not result in unreasonable interference with subsistence harvests.

A discussion of resolutions reached during this consultation process, specific conflict avoidance agreement(s), and plans for continued consultation shall be included in the permit application, exploration plan, or the development and production plan. In particular, the lessee shall show in the plan how its activities, in combination with other activities in the area, will be scheduled and located to prevent unreasonable conflicts with subsistence activities. Lessees also shall include a discussion of multiple or simultaneous operations, such as exploration and delineation well drilling and seismic activities, that can be expected to occur during operations to more accurately assess the potential for any cumulative effects. Communities, individuals, and other entities who were involved in the consultation shall be identified in the application or plan. The AO shall send a copy of the exploration plan or development and production plan (including associated oil-spill-contingency plans) to the potentially affected communities, the NSB, and the Subsistence Advisory Panel at the time they are submitted to the BLM to allow concurrent review and comment as part of the plan approval process.

In the event no agreement is reached between the parties, the AO shall consult with representatives from the subsistence communities, Subsistence Advisory Panel, NSB, and the lessee(s) to specifically address the conflict and attempt to resolve the issues before making a final determination on the adequacy of the measures taken to prevent unreasonable conflicts with subsistence harvests.

The lessee shall notify the AO of all concerns expressed by subsistence users during operations and of steps taken to address such concerns. Lease-related use will be restricted, when the AO determines it is necessary to prevent unreasonable conflicts with local subsistence hunting, fishing, and other subsistence activities.

In enforcing this stipulation, the AO will work with other agencies and the public to assure that potential conflicts are identified and efforts are taken to avoid these conflicts, e.g., planning seismic operations to avoid traditional land use sites and allotments. These efforts may include seasonal drilling restrictions, seismic restrictions, and directional drilling requirements or use of other technologies deemed appropriate by the AO.

The consultation process described in this stipulation will also be required of applicants for geophysical (i.e., seismic) permits to address potential conflicts with the setback requirements for cabins and campsites described in Stipulation 23. This consultation will help provide information to the AO on the advisability of modifying or waiving the restriction on seismic activity identified in Stipulation 23.

62. The following subsistence, wildlife habitat, and traditional/cultural land use areas are of significant concern to local communities and will be given special consideration during the consultation process outlined in Stipulation 61:

a. **Long-term cabins and campsites:** a 2-mile zone around the cabins and campsites.

b. **Ikpikpuk River:** a 2-mile zone from the east bank of the river.

c. **Miguakiak River:** a 3-mile zone from each bank of the river.

d. **Fish Creek:** 1) a 3-mile zone from each bank downstream from Sec. 31, T. 11 N., R. 1 E., U.M.; 2) a 2-mile zone from each bank in and upstream from Sec. 31, T. 11 N., R. 1 E., U.M.

e. **Judy Creek:** a 2-mile zone from each bank of the creek.

f. **Kogosukruk River:** a 2-mile zone from each bluff (or bank if there is no bluff) of the river (including the four tributaries off the southern bank) downstream from T. 2 N., R. 3 W., U.M.

g. **Kikiakrorak River:** a 2-mile zone from each bluff (or bank if there is no bluff) of the river downstream from T. 2 N., R. 4 W., U.M.

h. **Colville River:** a 2-mile zone from the west bluff (or bank if there is no bluff) extending the length of river in the Colville River Raptor, Passerine, and Moose LUEA.

In addition, a permittee or lessee engaged in oil and gas-related activity shall consult with the BLM, USFWS, ADFG, and the NSB regarding wildlife concerns prior to submitting a geophysical (i.e., seismic) permit, exploration plan, or development and production plan involving activity within the 2-mile zones around the Kogosukruk (and its tributaries), Kikiakrorak, and Colville rivers described above. In the event that the permittee or lessee and the agencies are unable to reach agreement on steps necessary to address wildlife concerns, the AO will consult with the other agencies and the permittee or lessee before making a determination on the adequacy of the measures taken to prevent conflicts with wildlife.

**Orientation Program:**

63. The lessee shall include in any application for permit to drill a proposed orientation program for all personnel involved in exploration or development and production activities (including personnel of lessee's agents, contractors, and subcontractors) for review and approval by the AO. The program shall be designed in sufficient detail to inform individuals working on the project of specific types of environmental, social, and cultural concerns that relate to the Planning Area. The program shall address the importance of not disturbing archaeological and biological resources and habitats, including endangered species, fisheries, bird colonies, and marine mammals and provide guidance on how to avoid disturbance. Guidance shall include the production and distribution of information cards on endangered and/or threatened species in the Planning Area. The program shall be designed to increase sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which personnel will be operating. The orientation program shall also include information concerning avoidance of conflicts with subsistence, commercial fishing activities, and pertinent mitigation.

The program shall be attended at least once a year by all personnel involved in on-site exploration or development and production activities (including personnel of lessee's agents, contractors, and subcontractors) and all supervisory and managerial personnel involved in lease activities of the lessee and its agents, contractors, and subcontractors. Individual training is transferable from one facility to another except for elements of the training specific to a particular site.

Lessees shall maintain a record onsite of all personnel who attend the program for so long as the site is active, though not to exceed the 5 most recent years of operations. This record shall include the name and dates(s) of attendance of each attendee.

**Traditional Land Use Sites:**

64. Lessees shall conduct an inventory of known traditional land use sites prior to any field activity. This inventory will be compiled from sites listed in the most current Traditional Land Use Inventory available from the NSB's Iñupiat History, Language, and Cultural Commission, and shall be approved by the AO. Based on this inventory, the lessee shall develop a plan to avoid these sites and mitigate any potential damage that could result from field activities. The plan shall indicate how access to the site by local subsistence users will be provided. Lessees shall submit copies of the plan to BLM and the Subsistence Advisory Panel with any application for permit to drill.

**Other Activities:**

65. It is the responsibility of the authorized user to ensure that all individuals brought to the Planning Area under its auspices adhere to these stipulations. Authorized users of the Planning Area shall provide all employees, contractors, subcontractors, and clients with a briefing regarding stipulations applicable to the lease and/or permit. A copy of applicable stipulations will be posted in a conspicuous place in each work site and campsite.

66. The authorized user shall protect all survey monuments and be responsible for survey costs if remonumentation is required as a result of the user's actions.

67. All activities shall be conducted to avoid or minimize disturbance to vegetation.

68. The BLM, through the AO, reserves the right to impose closure of any area to operators in periods when fire danger or other dangers to natural resources are severe.

69. The authorized user shall be financially responsible for any damage done by a wildfire caused by its operations.

70. Construction camps are prohibited on frozen lakes and river ice. Siting of construction camps on river sand and gravel bars is allowed and, where feasible, encouraged. Where leveling of trailers or modules is required and the surface has a vegetative mat, leveling shall be accomplished through blocking rather than use of a bulldozer.

71. Use of pesticides without the specific authority of the AO is prohibited.

72. The feeding of wildlife by authorized users is prohibited.

73. Hunting and trapping by lessee's employees, agents, and contractors are prohibited when persons are on "work status." Work status is defined as the period during which an individual is under the control and supervision of an employer. Work status is terminated when the individual's shift ends and he/she returns to a public airport (e.g., Fairbanks, Barrow, Nuiqsut, or Deadhorse). Use of lessee facilities, equipment, or transport for personnel access or aid in hunting and trapping is prohibited.

74. Lessees shall conduct a cultural and paleontological resources survey prior to any ground-disturbing activity. Upon finding any potential cultural or paleontological resource, the lessee or their designated representative shall notify the AO and suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the AO.

75. Petroleum exploration and production activities are prohibited within ½ mile of occupied grizzly bear dens, identified by the ADFG, unless alternative mitigation measures are approved by the AO in consultation with appropriate federal, state, and NSB regulatory and resource agencies.

76. Oil and gas lessees and their contractors and subcontractors will prepare and implement bear-interaction plans to minimize conflicts between bears and humans. These plans shall include measures to: (a) minimize attraction of bears to the drill sites; (b) organize layout of buildings and work areas to minimize human/bear interactions; (c) warn personnel of bears near or on drill sites and identify proper procedures to be followed; (d) if authorized, deter bears from the drill site; (e) provide contingencies in the event bears do not leave the site or cannot be deterred by authorized personnel; (f) discuss proper storage and disposal of materials that may be toxic to bears; and (g) provide a systematic record of bears on the site and in the immediate area. The lessees shall develop educational programs and camp layout and management plans as they prepare their lease operations plans. These plans shall be developed in consultation with appropriate federal, state, and NSB regulatory and resource agencies and submitted to the AO.

77. Operators are encouraged to apply for a letter of authorization from the USFWS to conduct activities in polar bear denning areas.

78. Permanent structures, other than oil and gas facilities, are prohibited within 100 feet of the highest high water mark of the nearest body of water.

79. Lessees shall use smokeless flares for handling routine conditions and use auxiliary smokeless flares for planned events that exceed the capacity of routine flares. Lessees shall use flares that meet the federal New Source Performance design standards listed in 40 CFR § 60.18.

# APPENDIX F

# STANDARDIZED STIPULATIONS APPLIED TO MITIGATE THE IMPACTS OF NON-OIL AND GAS AUTHORIZATIONS

# APPENDIX F

# STANDARDIZED STIPULATIONS APPLIED TO MITIGATE THE IMPACTS OF NON-OIL AND GAS AUTHORIZATIONS

The following is a list of stipulations that the Bureau of Land Management (BLM) commonly applies to authorizations it issues in the Northeast National Petroleum Reserve – Alaska to mitigate the impacts for these activities. It is very unlikely that any authorization would contain most of these stipulations. Rather, depending on the nature of the activity being authorized, the time of year during which the activity would occur, and the lands and resources likely to be impacted by the activity, different stipulations from this list would apply. The "Holder" refers to the party receiving use authorization from BLM; in some authorizations the term is modified to Permittee, Lessee, or other similar designation.

1. All operations will be conducted in such a manner as not to cause damage or disturbance to any fish or wildlife or to subsistence resources.
2. Chasing by vehicles or buzzing by aircraft of any wildlife is prohibited. Particular attention will be given to not disturbing caribou.
3. The holder shall prohibit the feeding of wildlife. Garbage or other potentially edible items, which would attract wildlife, shall be kept in covered containers while awaiting incineration.
4. Aircraft shall maintain 1,000 feet above ground level (except for take off and landings) over designated caribou concentration areas (i.e., winter and summer ranges, insect-relief areas, etc.) during the specific time period designated (winter - October 1st through May 15th, summer - May 15th through September 30th), unless doing so would endanger human life or safe flying practices.
5. All operations shall be conducted with due regard for good resource management and in such a manner as not to block any stream, or drainage system, or change the character or course of a stream, or cause the pollution or siltation of any stream or lake.
6. All activities shall be conducted so as to avoid or minimize disturbance to vegetation.
7. Any cultural or paleontological resource (historic or prehistoric site or object) discovered by the Holder, or any person working on his behalf, on public or federal land shall be immediately reported to the Authorized Officer (AO). The Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the AO. An evaluation of the discovery will be made by the AO to determine appropriate actions to prevent the loss of significant cultural or scientific values. The Holder will be responsible for the cost of evaluation and any decision as to the proper mitigation measures will be made by the AO after consulting with the Holder.
8. Crossing of waterway courses shall be made using a low angle approach in order not to disrupt the naturally occurring stream or lake banks.
9. Camps will be situated on gravel bars, sand, or other durable lands. Where leveling of trailers or modules is required and the surface has a vegetative mat, leveling will be accomplished with blocking rather than leveling with a bulldozer.
10. Black water shall be kept separate from gray water and kitchen wastewater. Gray wash water and kitchen wastewater may be filtered to remove solids and the liquid discharged to the land surface. All solids and sludges shall be incinerated.

11. All solid wastes shall be removed from the public lands to Alaska Department of Environmental Conservation (ADEC)-approved solid waste disposal facilities. Solid waste combustibles may be incinerated. All non-combustible solid waste, including ash from incineration and fuel drums, shall be removed for approved disposal. There will be no burial of garbage or human wastes.
12. All fuel spills will be cleaned up immediately, taking precedence over all other matters, except the health and safety of personnel. Spills will be cleaned up utilizing absorbent pads or other ADEC approved methods.
13. As soon as possible, but not later than 24 hours, notice of any such discharge of oil or hazardous substance as defined in AS 46.03.755, 18 AAC § 75.300.307, will be given to the AO and any other federal and state officials as are required by law.
14. ADEC-approved oil spill cleanup materials (absorbents) will be carried by each field crew and stored at all fueling points and vehicle maintenance areas.
15. State and federal safety standards for fuel handling will be followed.
16. No fuel storage or refueling of equipment will be allowed within the flood plain of a river or lake.
17. Drip basins or absorbent diapers will be placed under all non-dry disconnect-type fuel line couplings and valves.
18. Fuel and other petroleum products storage of 55 gallons or greater must have secondary containment with 110 percent of the capacity of the primary storage. The secondary containment, such as lined and bermed systems, must meet local, state and federal codes and regulations. Above-ground storage of fuels or other petroleum products in excess of 660 gallons, or an aggregate above-ground storage capacity of greater than 1,320 gallons; or any facility which, due to location, could reasonably expect spilled fuels to reach waters of the U.S or adjoining shorelines must prepare and maintain a Spill Prevention Control and Countermeasure (SPCC) Plan in accordance with 40 CFR § 112 regulations.
19. All fuel containers, including barrels and propane tanks, shall be marked with the Holder's name, product type, and year filled or purchased (e.g., Company Name, Hydraulic Fluid, 1994).
20. All structures will be painted so as to blend into the natural environment. All colors are to be pre-approved by the AO of the BLM.
21. All operations must not impede rural residents from pursuing their traditional subsistence activities (ANILCA, PL 96-487).
22. During construction the Holder shall provide a bond in the amount of $__________, to be maintained until restoration of the disturbed areas and other requirements relative to the construction phase of the project have been accepted by the AO. Upon completion, or partial completion of these construction-related requirements, the AO may terminate or reduce the amount of the bond.
23. During termination, a bond, acceptable to the AO, shall be furnished by the Holder by ____________ or at such earlier date as may be specified by the AO. The amount of this bond shall be determined by the AO. This bond must be maintained in effect until removal of improvements and restoration of the rights-of-way/permit have been accepted by the AO.
24. Should the bond delivered under this grant/permit become unsatisfactory to the AO, the Holder, shall, within 30 days of demand, furnish a new bond.
25. The Holder agrees that all monies deposited with the AO as security for the Holder's performance of the terms and conditions of this grant/permit may, upon failure on the holder's part to fulfill any of the requirements herein set forth or made a part hereof, be retained by the U.S to be applied as far as may be needed to the satisfaction of the Holder's obligations assumed hereunder, without prejudice whatever to any other rights and remedies of the U.S.

26. The Holder shall comply with all applicable federal, state and local laws and regulations thereunder, existing or hereafter enacted or promulgated, affecting in any manner, construction, operation, or maintenance of the authorized structures and surrounding lands.

27. The U.S. reserves the right to use the lands or to authorize the use of the lands in any way compatible with the authorized use. Authorized representatives of federal and state agencies, and state or local law enforcement personnel shall at all times have the right to enter the premises on official business.

28. This permit/lease does not authorize the cabin(s) or site to be used for a residence or for any purposes not specified on the permit/lease. Any changes must be approved in advance by the AO. The authorization grants no unspecified privileges, such as exclusive use of a trapping area, etc.

29. No authorized prior existing uses will be interfered with by the holder of the lease/permit, nor will any public access routes, including, but not limited to trails, roads, river, and streams, be blocked or otherwise disturbed.

    (For use only with commercial cabins), the Holder shall submit a yearly statement which includes:

    - period(s) of use;
    - purpose of use; and
    - revenues generated by use.

    Copies of receipts indicating gross income shall be submitted yearly. Failure to submit the required statement of use for cabin(s) for a period of 2 consecutive years will result in a determination that the cabin(s) has been abandoned and the lease/permit will be canceled.

30. Failure to construct during an 18-month period after issuance of the lease/permit will result in a determination that the cabin(s) and/or site has been abandoned and the lease/permit will be canceled.

    Commercial Cabin(s): This lease/permit may be transferred, subleased, or rented by the lessee only after receiving written authorization from the AO.

    Special Cabin(s): The structure(s) authorized shall not be subleased or rented.

31. Clearing of vegetation is permitted only for the area of the actual construction site and brushing for fire protection; in other areas the vegetation will be left in its natural state.

32. The applicant shall obtain a house log permit or sale for logs used in construction of structures.

33. The applicant shall obtain a firewood cutting permit which shall be limited to dead timber (down or standing).

34. If the Holder discovers any archeological, paleontological, or historical objects, he shall leave them in place and notify the AO within 30 days of their discovery.

35. The federal government shall not be held responsible for protection of the Holder's structures or other personal property. Fire protection in the area will be consistent with the approved fire management plan.

36. The Holder shall be liable for damages to public lands resulting from his/her negligent use of fire.

37. Outhouses will be located a minimum of at least 100 feet from the high-water mark of streams, rivers, or lakes. Pits will be backfilled with a minimum of 2 feet of over-material when the pit has reached capacity or the permit/lease is terminated. All outhouses must comply with ADEC standards.

38. The cabin(s) and surrounding area must be kept clear and litter free. Waste must be burned or incinerated as specified by State of Alaska law (11 AAC § 94.260) and noncombustible waste will be backhauled to an approved solid waste disposal site.

39. Fuel drums will be stored a minimum of 150 feet from any water body.

40. Violation of any of the terms of the lease/permit or associated stipulations shall be considered cause for termination. The cabin lease or permit may be terminated immediately, if necessary to prevent damage to public values or for public safety, if the permit site has not been brought into conformance.

41. Cabin permits and leases will expire upon conveyance of interim managed land to the State of Alaska or Native Corporation(s), unless an agreement has been reached with the entity receiving title (this agreement must be reached prior to issuance of the lease).

42. Upon termination, revocation, or cancellation of a lease or permit, the Holder shall remove all structures and improvements, except those owned by the U.S., within 60 days of the notice of termination, revocation, or cancellation, and shall restore the site to as nearly a natural condition as possible, unless otherwise agreed upon in writing or in the use authorization. If the Holder fails to remove all such structures of improvements within the agreed upon time period, the structures or improvements shall become the property of the U.S., however, this shall not relieve the holder of liability for the cost of any required removal and restoration of the site.

43. Cancellation of a lease or permit for any reason does not relieve the Holder of the responsibility and liability for cleaning up and rehabilitation of the site.

44. Precise geographic positions of all research sites associated with this authorization shall be submitted to the AO. These locations can be noted by either Latitude and Longitude or Universal Transverse Mercator coordinates.

45. A summary of the previous field seasons activities shall be submitted to the AO by December 31st of each year during the authorized period. The summary shall include the approximate number of times each site was visited, by how many people, and at what time periods. This summary shall also include any changes to the type of collection taking place and any proposed site additions.

46. A copy of published results from the data acquired will be submitted to the AO upon permit expiration or renewal.

47. The Holder shall protect all survey monuments. Survey monuments include, but are not limited to, General Land Office and BLM Cadastral Survey Corners, reference corners, witness points, U.S. Coast and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any of the above, the Holder shall immediately report the incident, in writing, to the AO and the respective installing agency, if known. Where General Land Office or BLM rights-of-way monuments or references are obliterated during operations, the Holder shall secure the services of a registered land surveyor or a BLM Cadastral surveyor to restore the disturbed monuments and references using surveying procedures found in the *Manual of Surveying Instructions for the Survey of Public Lands of the U.S.*, latest edition. If the BLM Cadastral surveyors or other federal surveyors are used to restore the disturbed survey monuments, the Holder shall be responsible for survey costs.

# APPENDIX G

# BLM SENSITIVE SPECIES LIST FOR ALASKA

# United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Alaska State Office
222 West Seventh Avenue, #13
Anchorage, Alaska 99513-7599
http://www.ak.blm.gov

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6840 (931) P

April 30, 2004

Instruction Memorandum No. AK 2004-028
Expires: 09/30/2005

To: Field Managers, DSDs and AFS Manager

From: State Director

Subject: Special Status Species List for Alaska

Attached is the Bureau of Land Management-Alaska threatened, endangered and sensitive species list. This list was derived over the past four years using information gathered from the Alaska Natural Heritage Program, the Nature Conservancy, Alaska Department of Fish and Game, U.S. Fish and Wildlife Service and the National Park Service. For information purposes this list includes those species listed, or proposed, under the authority of the Endangered Species Act of 1973, as amended, even though most of those species do not occur on BLM administered lands. The sensitive species includes only those species that have been determined to likely occur on BLM administered lands in Alaska. This list has been developed using guidance provided in the BLM 6840 Manual.

Addressing special status species is a requirement in our land use plans and environmental assessments to ensure that actions taken by BLM are consistent with the conservation needs of special status species and do not contribute to the need to list any special status species under the provisions of the Endangered Species Act of 1973, as amended.

Since many of the species on this list are there because of a general lack of inventory, this list may be modified to exclude, or add, species in the future, as inventories are completed. This list should be reviewed annually by the wildlife, fisheries and special status species functional groups, for potential additions, or deletions.

If you have any questions please contact John Payne, 907-271-3431.

## APPENDIX G

# BLM SENSITIVE SPECIES LIST FOR ALASKA

| Common Name | Scientific Name |
|---|---|
| **PLANTS** | |
| Alaska bluegrass | *Poa hartzii alaskana* |
| Alaskan glacier buttercup | *Beckwithia glacialis* spp. *alaskansis* |
| Aleutian saxifrage | *Saxifraga aleutica* |
| Aleutian whitlow-grass | *Draba aleutica* |
| Aleutian wormwood | *Artemisia aleutica* |
| Alpine draba | *Draba micropetala* |
| Arctic locoweed | *Oxytropis arctica* var. *barnedyana* |
| Bering dwarf primrose | *Douglasia beringensis* |
| Calder's bladderpod | *Lesquerella calderi* |
| Calder's licorice-root | *Ligusticum calderi* |
| Drummond's bluebell | *Mertensia drummondii* |
| Hairy lousewort | *Pedicularis hirsuta* |
| Kobuk locoweed | *Oxytropis kobukensis* |
| Moonwort | *Botrychium ascendens* |
| Mountain avens | *Senecio moresbiensis* |
| Muir's fleabane | *Erigeron muirii* |
| Murray's whitlow-grass | *Draba murrayi* |
| Narrow-leaved prairie rocket | *Erysimum asperum* var. *angustatum* |
| Nodding semaphoregrass | *Pleuropogon sabinei* |
| Ogilvie Mountains springbeauty | *Claytonia ogilviensis* |
| Ogilvie Mountains whitlow-grass | *Draba ogilviensis* |
| Pear-shaped candytuft | *Smelowskia pyriformis* |
| Purple wormwood | *Artemisia globularia* var. *lutea* |
| Pygmy aster | *Aster pygmaeus* |
| Sessile-leaved scurvy grass | *Cochlearia sessilifolia* |
| Shacklette's catseye | *Cryptantha shacletteana* |
| Stipulated cinquefoil | *Potentilla stipularis* |
| Tundra whitlow-grass | *Draba kananaskis* |
| Willow | *Salix reticulata* spp. *glabellicarpa* |
| Yellow-ball wormwood | *Artemisia senjavinensis* |
| Yukon podistera | *Podistera yukonensis* |
| Yukon wild buckwheat | *Eriogonum flavum* var. *aquilinum* |

| Common Name | Scientific Name |
|---|---|
| **FISH** | |
| Angayukaksurak char | *Salvelinus anaktuvukensis* |
| Beaver Creek chinook salmon | *Oncorhynchus tshawytscha* |
| Clear Creek chum salmon | *Oncorhynchus keta* |
| Gulkana steelhead | *Oncorhynchus mykiss* |
| Kigliak char | *Salvelinus alpinus* |
| Western brook lamprey | *Lampetra richardsoni* |
| **BIRDS** | |
| Black brant | *Branta bernicla* |
| Black guillemot | *Cepphus grylle* |
| Black scoter | *Melanitta nigra* |
| Blackpoll warbler | *Dendroica striata* |
| Black-tailed godwit | *Limosa limosa* |
| Bristle-thighed curlew | *Numenius tahitiensis* |
| Buff-breasted sandpiper | *Tryngites subruficollis* |
| Dovekie | *Alle alle* |
| Dusky Canada goose | *Branta canadensis occidentalis* |
| Gray-cheeked thrush | *Catharus minimus* |
| Harlequin duck | *Histrionicus histrionicus* |
| King eider | *Somateria spectabilis* |
| Kittlitz's murrelet | *Brachyramphus brevirostris* |
| Long-tailed duck | *Clangula hyemalis* |
| Marbled godwit | *Limosa fedoa* |
| Marbled murrelet | *Brachyramphus marmoratus* |
| McKay's bunting | *Plectrophenax hyperboreus* |
| Northern goshawk (Queen Charlotte) | *Accipiter gentilis laingi* |
| Olive-sided flycatcher | *Contopus cooperi borealis* |
| Red knot | *Calidris canutus* |
| Red-throated loon | *Gavia stellata* |
| Surf scoter | *Melanitta perspicillata* |
| Townsend's warbler | *Dendroica townsendi* |
| Trumpeter swan | *Cygnus buccinator* |
| Tule white-fronted goose | *Anser albifrons gambelli* |
| Yellow-billed loon | *Gavia adamsii* |
| **MAMMALS** | |
| Canada lynx | *Lynx canadensis* |
| Harbor seal | *Phoca vitulina concolor* |

# APPENDIX H

# COMMON, SCIENTIFIC, AND IÑUPIAQ NAMES OF SPECIES LISTED IN AMENDED IAP/EIS

# APPENDIX H

# COMMON, SCIENTIFIC, AND IÑUPIAQ NAMES OF SPECIES LISTED IN AMENDED IAP/EIS

| Common Name | Scientific Name | Iñupiaq Name[1] |
|---|---|---|
| **VEGETATION** | | |
| **Small Trees and Shrubs** | | |
| Alpine blueberry | *Vaccinium uliginosum* | Suġaq/asriavik/asiaq/asiavik |
| Cloudberry | *Rubus chamaemorus* | Aqpik |
| Crowberry | *Empetrum nigrum* | Paunġaq |
| Dwarf birch | *Betula nana* ssp. *exilis* | — |
| Lapland cassiope | *Cassiope tetragona* | Ikuġutigiksut |
| Lingonberry | *Vaccinium vitis-idaea* | Kikmiññaq/kipmiŋnaq |
| Northern labrador tea | *Ledum palustre* ssp. *decumbens* | Tilaaqiaq |
| Sitka alder | *Alnus crispa* ssp. *decumbens* | — |
| **Grasses** | | |
| (unknown) | *Poa lanata* | — |
| Alkali grass | *Puccinellia phryganodes* | — |
| Hartz's bluegrass | *Poa hartzii* ssp. *alaskana* | — |
| Pendent grass | *Arctophila fulva* | — |
| Polar grass | *Arctagrostis latifolia* | — |
| Sabine grass | *Pleuropogon sabinei* | — |
| Tufted hairgrass | *Deschampsia ceaspitosa* | — |
| **Sedges** | | |
| Cottongrass | *Eriophorum angustifolium* | — |
| Cottongrass | *Eriophorum resseolum* | — |
| Tussock cottongrass | *Eriophorum vaginatum L.* | Maniq |
| Water sedge | *Carex aquatilis* | — |
| **Wildflowers** | | |
| (unknown) | *Draba adamsii* | — |
| Drummond's bluebell | *Mertensia drummondii* | — |
| Fireweed | *Epilobium latifolium* | Quppiqutaq |
| Marsh fivefinger | *Potentilla palustris* | — |
| Marsh marigold | *Caltha palustris* | — |
| Pygmy aster | *Aster pygemaeus* | — |
| Scurvy grass | *Cochlearia officianalis* | — |
| Stipulated cinquefoil | *Potentilla stipularis* | — |
| Sweet coltsfoot | *Petasites firgidus* | — |

| Common Name | Scientific Name | Iñupiaq Name[1] |
|---|---|---|
| **FISH** | | |
| **Freshwater Species** | | |
| Alaska blackfish | *Dallia pectoralis* | iłuuqiñiq |
| Arctic grayling | *Thymallus arcticus* | Sulukpaugaq |
| Arctic lamprey | *Lampetra japonica* | Nimigiaq |
| Burbot | *Lota lota* | Tittaaliq |
| Lake trout | *Salvelinus namaycush* | Iqaluaqpak |
| Longnose sucker | *Catostomus catostomus* | Milugiaq |
| Ninespine stickleback | *Pungitius pungitius* | Kakalisauraq |
| Northern pike | *Esox lucius* | Siulik |
| Round whitefish | *Prosopium cylindraceum* | Savigunnaq |
| Slimy sculpin | *Cottus cognatus* | Kanayuq |
| Threespine stickleback | *Gasterosteus aculatus* | — |
| **Anadromous Species** | | |
| Arctic cisco | *Coregonus autumnalis* | Qaataq |
| Bering cisco | *Coregonus laurettae* | Tiipuq |
| Chinook salmon | *Oncorhynchus tshawytscha* | — |
| Chum salmon | *Oncorhynchus keta* | Iqalugruaq |
| Coho salmon | *Oncorhynchus kisutch* | Iqalugruaq |
| Pink salmon | *Oncorhynchus gorbuscha* | Amaqtuuq |
| Rainbow smelt | *Osmerus mordax* | Iłhuaġniq |
| Sockeye salmon | *Oncorhynchus nerka* | — |
| **Amphidromous Species** | | |
| Arctic char | *Salvelinus alpinus* | Iqalukpik |
| Broad whitefish | *Coregonus nasus* | Aanaaqłiq |
| Dolly varden | *Salvelinus malma* | Iqalukpik |
| Humpback whitefish | *Coregonus pidschian* | Piquktuuq |
| Least cisco | *Coregonus sardinella* | Iqalusaaq |
| **Marine Species** | | |
| Arctic cod | *Boregogadus saida* | Uugaq |
| Arctic flounder | *liopsetta glacialis* | Nataaġnaq |
| Capelin | *Mallotus villosus* | Panmigriq |
| Fourhorn sculpin | *Myoxocephalus quadricornis* | Kanayuq |
| Kelp snailfish | *Liparis tunicatus* | — |
| Lingcod | *Ophiodon elongatus* | — |
| Pacific herring | *Clupea harengus* | Uqsruqtuuq |
| Pacific sandlance | *Ammodytes hexapterus* | — |
| Saffrom cod | *Eleginus gracilis* | Uugaq |

| **Common Name** | **Scientific Name** | **Iñupiaq Name**[1] |
|---|---|---|
| **BIRDS** | | |
| **Seabirds** | | |
| Arctic tern | *Sterna paradisea* | Mitqutaiḷḷaq |
| Black guillemot | *Cepphus grylle* | Iŋaġiq |
| Glaucous gull | *Larus hyperboreus* | Nauyavasrugruk |
| Jaeger | *Stercorarius* spp. | — |
| Long-tailed jaeger | *Stercorarius longicaudus* | Isuŋŋaq |
| Parasitic jaeger | *Stercorarius parasiticus* | Miġiaqsaayuk |
| Pomarine jaeger | *Stercorarius pomarinus* | Isuŋŋaġluk |
| Sabine's gull | *Xema sabini* | Aqargigiaq |
| **Loons** | | |
| Pacific loon | *Gavia pacifica* | Malġi |
| Red-throated loon | *Gavia stellata* | Qaksrauq |
| Yellow-billed loon | *Gavia adamsii* | Tuutlik |
| **Waterfowl** | | |
| Black brant | *Branta nigricans* | Niġlinġaq |
| Canada goose | *Branta canadensis* | Iqsraġutilik |
| Common eider | *Somateria mollissima* | Amauligruaq |
| King eider | *Somateria spectabilis* | Qiŋalik |
| Lesser snow goose | *Anser caerulescens caerulescens* | — |
| Long-tailed duck | *Clangula hyemalis* | Aahaaliq |
| Northern pintail | *Anas acuta* | Kurugaq |
| Scaup | *Aythya* spp. | — |
| Scoter | *Melanitta* spp. | — |
| Spectacled eider | *Somateria fischeri* | Qavaasuk |
| Steller's eider | *Polysticta stelleri* | Igniqauqtuq |
| Tundra swan | *Cygnus columbianus* | — |
| White-fronted goose | *Anser albifrons* | Kigiyuk/niġlivaiḷuk |
| **Shorebirds** | | |
| American golden-plover | *Pluvialis dominica* | Tullik |
| Baird's sandpiper | *Erolia bairdii* | Puviaqtuuyaaq |
| Bar-tailed godwit | *Limosa lapponica* | Turraaturaq |
| Black-bellied plover | *Squatarola squatarola* | Tullikpak |
| Buff-breasted sandpiper | *Tryngites subruficollis* | Satqagiiḷaq |
| Dunlin | *Erolia alpina* | Siiyukpaligauraq |
| Long-billed dowitcher | *Linnodromus scolopaceus* | Siiyukpalik |
| Pectoral sandpiper | *Erolia melanotos* | Puviaqtuuq |
| Red phalarope | *Phalaropus fulicarius* | Auksruaq |
| Red-necked phalarope | *Phalaropus lobatus* | — |

| Common Name | Scientific Name | Iñupiaq Name[1] |
|---|---|---|
| **Shorebirds (continued)** | | |
| Ruddy turnstone | *Arenaria interpres* | Tullignaq |
| Semipalmated sandpiper | *Ereunetes pusillus* | Livilivillakpak |
| Stilt sandpiper | *Micropalama griseus* | — |
| **Raptors** | | |
| Arctic peregrine falcon | *Falco peregrinus tundrius* | — |
| Bald eagle | *Haliaeetus leucocephalus* | Tiŋmiaqpak |
| Gyrfalcon | *Falco rusticolus* | — |
| Northern harrier | *Circus cyaneus* | Papiktuuq |
| Peregrine falcon | *Falco peregrinus* | Kirgavik |
| Rough-legged hawk | *Buteo lagapus* | Qiḷġiq |
| Short-eared owl | *Asio flammeus* | Nipaiłuktaq/nipaiḷuktaq |
| Snowy owl | *Nyctea scandiaca* | Ukpik |
| **Ptarmigan** | | |
| Ptarmigan | *Lagopus spp.* | — |
| Rock ptarmigan | *Lagopus mutus* | Niqsaaqtuŋiq |
| **Passerine** | | |
| Common raven | *Corvus corax* | Tulugaq |
| Lapand longspur | *Calcarius lapponicus* | Qupałuk/putukiiłuk |
| Redpoll | *Acanthis spp.* | Saqsakiq |
| Savannah sparrow | *Passerculus sandwichensis* | Aanaruiñ suliuqpa |
| Snow bunting | *Plectrophenax nivalis* | Amautligaq/avataliġuuvaq/ amautlikkauraq/amaułigaaluk |
| **MAMMALS** | | |
| **Large Mammals** | | |
| Arctic fox | *Alopex lagopus* | Qusrhaaq/tiġiganniaq/qułhaaq |
| Caribou | *Rangifer tarandus* | Tuttu |
| Dall sheep | *Ovis dalli dalli* | Imnaiq/ipnaiq |
| Gray wolf | *Canis lupus* | Amaġuq |
| Grizzly (brown) bear | *Ursus arctos* | Akłaq |
| Lynx | *Lynx canadensis* | Niutuuyiq/niutuiyiq/nuutuuyiq |
| Moose | *Alces alces* | Tiniikaq/tuttuvak/tiniika |
| Muskox | *Ovibos moschatus* | Umiŋmak/imummak |
| Red fox | *Vulpes vulpes* | Kavviaq/kayuqtuq |
| Wolverine | *Gulo gulo* | Qavvik/qapvik |
| **Small Mammals** | | |
| Arctic ground squirrel | *Spermophilus parryii* | Siksrik |
| Barrenground shrew | *Sorex ugyunak* | — |
| Brown lemming | *Lemmus trimucronatus* | Aviŋŋaq |

| Common Name | Scientific Name | Iñupiaq Name[1] |
|---|---|---|
| **Small Mammals (continued)** | | |
| Collared lemming | *Dicrostonyx groenlandicus* | Qiḷaŋmiutauraq |
| Ermine (short-tailed weasel) | *Mustela erminea* | Itiġiaq/tiġiaq |
| Least weasel | *Mustela nivalis* | — |
| Northern red-backed vole | *Clethrionomys rutilus* | — |
| Singing vole | *Microtus miurus* | Aviññaq |
| Snowshoe hare | *Lepus americanus* | Ukalliuraq/ukalliq |
| Tundra shrew | *Sorex tundrensis* | Ugruŋnaq |
| Tundra vole | *Microtus oeconomus* | Aviññaq |
| **Other Mammals** | | |
| Coyote | *Canis latrans* | Amaġuuraq |
| Mink | *Mustela vison* | Tiġiaqpak |
| Porcupine | *Erethizon dorsatum* | Iḷuqutaq/qiŋaġluk |
| River otter | *Lutra canadensis* | Pamiuqtuuq |
| **Marine Mammals** | | |
| Bearded seal | *Erignathus barbatus* | Ugruk |
| Beluga whale | *Delphinapterus leucas* | Sisuaq/kilalugak |
| Bowhead whale | *Balaena mysticetus* | Aġviq |
| Polar bear | *Ursus maritimus* | Nanuq |
| Ringed seal | *Phoca hispida* | Qaiġulik/qaiġutlik |
| Spotted seal | *Phoca largha* | Qasigiaq |

[1] Iñupiaq names from web site edition of *Iñupiat Eskimo Dictionary*: [http://www.alaskool.org/language/dictionaries/inupiaq/dictionary.htm]. Accessed on April 22, 2004.

# APPENDIX I

# HISTORIC SITES

# APPENDIX I

# DOCUMENTED ALASKA HERITAGE RESOURCE SERVICES SITES AND TRADITIONAL LAND USE INVENTORY SITES IN THE NORTHEAST NATIONAL PETROLEUM RESERVE – ALASKA

## I.1 Documented Alaska Heritage Resource Services Sites

| AHRS NO. | OTHER NO.[1] | SITE NAME | DESCRIPTION | DATE/PERIOD |
|---|---|---|---|---|
| | | **Prehistoric** | | |
| HAR-002 | NSB CRSI 2278 | HAR-002 | Scattered artifacts (e.g., flint spall, ground slate, cut antler, ivory harpoon dart head, bird bone). By 1980, site was destroyed by erosion. | Prehistoric |
| HAR-003 | | HAR-003 | Isolated black chert flake, carved tent stake, pole. | Prehistoric |
| HAR-009 | | HAR-009 | Isolated tan chert flake. | Prehistoric |
| HAR-047 | | HAR-047 | Gray chert artifacts (e.g., tip/midsection of endblade (ASTt), flake core, retouched flake), scattered bones, bone fragments. | Prehistoric (ASTt) |
| HAR-050 | | HAR-050 | Four black chert flakes. | Prehistoric |
| HAR-155 | TLUI 63 | UYAGAGVIIT (UYAGAGVIK) | Beach used as quarry for net weight stones, remains of wall tent/ wooden stakes - used for trapping, hunting, fishing, game lookout. | Prehistoric |
| HAR-169* | TLUI 58 & +6 | NEGILIK (NILIK, NERLIK, NIRLIK, NECHELIK, WOODS' INAAT, WOODS CAMP) | Historic/prehistoric trading - smokehouse/drying rack, generator shed with motor, storage houses, the Woods' residence house, wood covered ice cellar, 3 graves, buildings belonging to the Helmericks, 4 sod house ruins, camp area (surface scatter of caribou bone, antler, fire-cracked rock, wood, bone and stone artifacts). | Prehistoric/Historic (AD 1930s-1940s) |
| IKR-058 | ROS 78-005 | IKR-058 | Cranium of a large mammal with unassociated shotgun shell and candy bar wrappers nearby. | Prehistoric |
| IKR-073 | | IKR-073 | A single chert waste flake. | Prehistoric |
| TES-002 | ROS 78-011 | PAPTAUN | Fishing and hunting camp (e.g., small firepits, bone, canvas cloth, tin cans, cut/sawn caribou antler, 2 chert flakes, cork float fragment, and caribou antler net sinker). | Prehistoric/Historic |
| TES-004 | | TES-004 | A single chert flake. | Prehistoric |
| TES-005 | | TES-005 | An isolated Putu-like projectile point base. | Prehistoric |
| TES-007 | | TES-007 | Isolated chert flake. | Prehistoric |
| TES-008 | | TES-008 | Isolated projectile point. | Prehistoric (Norton?) |
| TES-009 | | TES-009 | Isolated flake knife. | Prehistoric (late ASTt – Norton/Ipiutak?) |
| TES-012 | | TES-012 | Small scatter of lithics, including 12 flakes, a rough biface, and a projectile point or | Prehistoric (Denbigh or ASTt?) |

| AHRS NO. | OTHER NO.[1] | SITE NAME | DESCRIPTION | DATE/PERIOD |
|---|---|---|---|---|
| | | | knife. | |
| TES-014 | | TES-014 | Scattered cultural material from a large multicomponent site (e.g., microblades, obsidian point base, bullet, biface segment, projectile point fragment, pottery, arrowshaft base, quartzite hammerstone, debitage, walrus ivory, cracked caribou bone, flakes, recent debris). | Prehistoric/Historic |
| TES-015 | | TES-015 | A wooden kayak/sled piece, 3 bone sled-shoe pieces (stone-drilled holes). | Prehistoric |
| TES-020 | | TES-020 | Two rectangular sod house ruins, large sod meat cellar/storage facility. No historic items. | Prehistoric |
| TES-051 | | | Microblade and weathered caribou bones. | Prehistoric |
| TES-054 | | T78-1 | Chert flakes. | Prehistoric |
| TES-057 | | KEALOCK | Dark brown and black chert flakes. | Prehistoric (early Holocene) |
| UMI-001 | Solecki 26 | UMI-001 | Approximately 10-15 waste flakes scattered over a wide area on a pronounced bench or knoll. | Prehistoric |
| UMI-002 | | UMI-002 | Scattered artifacts (e.g., 20+ flakes - small blade-like flake fragments and bone fragments). | Prehistoric |
| UMI-003 | | UMI-003 | Isolated side blade. | Prehistoric |
| UMI-004 | | UMI-004 | Six waste flakes. | Prehistoric |
| UMI-005 | | UMI-005 | Collapsed cairn and large flake scatter (e.g., 500+ flakes [sections of blade-like flakes/utilized flakes], bifaces and biface fragments). | Prehistoric |
| UMI-006 | ROS78-003 | UMI-006 | Small lithic scatter (e.g., 25+ waste flakes/ utilized flakes, blade-like flake, 30.06 shell casing and caribou rack). | Prehistoric/Historic |
| | | | **Historic** | |
| HAR-004 | TLUI 70 | KITIK | Quarry for the material known as *kitik* ("pulverized stone"), a fine-grained volcanic ash used traditionally in skin processing. Important Inupiat traditional cultural property. | Historic |
| HAR-005 | | | Sod house and boat. | Historic |
| HAR-006 | | | Antler artifact and caribou bones on the beach at a drained lake. | Historic |
| HAR-007 | | | Reindeer herding driftwood fence/tent platforms. | Historic |
| HAR-010 | | KIKKAQ | Wooden marker surrounded by cobbles that commemorates a favorite camping area. | Historic (AD 1970s) |
| HAR-011 | TLUI 43<br>NSB CRSI 2241 | SIKULIK | Subsistence camp - standing cabin, sod house pit, wood-covered ice cellar, and grave. | Historic to modern |
| HAR-012 | TLUI 46<br>NSB CRSI 2244 | AGKI | House, sod house pit (e.g., wall timbers, corner posts, floor boards/collapsed ceiling remains, reindeer bones, skulls, antlers topped by a yellow plastic wind survey disk, a fox trap, and scattered surface debris). | Historic (AD 1920s) |

| AHRS NO. | OTHER NO.[1] | SITE NAME | DESCRIPTION | DATE/PERIOD |
|---|---|---|---|---|
| HAR-013 | NSB CRSI A | UGUAK (OYAGAK) | House pits/sod house ruins, recent cabins, dog tether stakes, scattered surface historic artifacts (e.g., enameled "honey pot," Thermos bottle), and an ice cellar with an intact wooden entry frame. | Historic |
| HAR-014 | NSB CRSI 2279 | HAR-014 | Reindeer corral complex of drift logs set vertically and close together into the ground and the remains of a semi-subterranean house. | Historic (1930s) |
| HAR-018 | NSB CRSI B | AHSOGEAK SITE | An area of fallen logs, scattered surface historic artifacts (e.g., stove, mirror, blue china). | Historic |
| HAR-019 | TLUI 38 NSB CRSI 2238 | ISUK (CAPE HALKETT) | Isook/Esook Trading Post - NSB TLUI #38 reports 9+ graves and 1+ ice cellars. | Historic |
| HAR-020 | TLUI 44 NSB CRSI 2242 | IKALUURUAK | A cabin, 2 graves, and 2 ice cellars. | Historic (AD 1927) |
| HAR-021 | TLUI 45 NSB CRSI 2243 | NIGLIVIK 1 | Tent sites and ice cellars. | Historic |
| HAR-022 | TLUI 49 NSB CRSI 2245 | SAKITUI (SAKTUINA POINT) | Edwardsen's Trading Post - sod houses and 1+ graves. Most/all features have eroded away. | Historic |
| HAR-023 | TLUI 42 NSB CRSI 2240 | APALLIVIK | NSB TLUI #42 reports a tent campsite. | Historic |
| HAR-024 | TLUI 50 NSB CRSI 2246 | QIQIKTAG | NSB TLUI #50 reports "several small low islands…occasionally used as tent sites." | Historic |
| HAR-025 | TLUI 51 NSB CRSI 2247 | TIKIGAQMIUT (TIKIRAGMIUT, ESKIMO ISLANDS) | NSB TLUI #51 reports this as an "old cemetery of Point Hope people who were kept from going ashore by area residents" and eventually starved to death. | Historic |
| HAR-026 | TLUI 52 NSB CRSI 2248 | ATIGARU POINT (ATIGRUK POINT, AMAULIK) | NSB TLUI #52 reported graves, sod house ruins, tent sites, storage rack, recent wooden rack, caribou bone, skull and antler rack, rusted traps, fuel drums, and recent debris. | Historic |
| HAR-027 | TLUI 53 NSB CRSI 2249 | KANIGLUQ | NSB TLUI #53 reported sod house ruins and/or ice cellars. | Historic |
| HAR-028 | TLUI 55 NSB CRSI 2250 | NUKRUAPAITC H | Reported hunting and camping area. | Historic |
| HAR-029 | TLUI 56 NSB CRSI 2251 | IKKALIPIK | At least one sod house was reported here - site destroyed by erosion by 2000. | Historic |
| HAR-030 | NSB CRSI 2276 | HAR-030 | A single sod house. | Historic |
| HAR-044 | | | Recently tended grave. | Historic to modern |
| HAR-048 | | HAR-048 | Sod house ruins (e.g., sod house remains, scattered surface debris [e.g., sheet metal wood stove, old lantern, tin cans, caribou rack]). | Historic (AD 1920-1930s) |
| HAR-049 | | HAR-049 | A scatter of historic artifacts (e.g., tin lids, burned and fragmented caribou bone). The site is probably an activity area (possibly caribou processing) of HAR-048. | Historic (AD 1920-1930s) |
| HAR-051 | | | Historic remains. | Historic |
| HAR-053 | | HAR-053 | An isolated human skull that was released to the Native community for re-burial. | Historic |
| HAR-054 | | NECHELIK CHANNEL LIFEBOAT | | Historic |
| HAR-058 | | | U.S. Coast & Geodetic Survey bronze memorial | Historic |
| HAR-065 | | | Small sod house foundation. | Historic |

| AHRS NO. | OTHER NO.[1] | SITE NAME | DESCRIPTION | DATE/PERIOD |
|---|---|---|---|---|
| HAR-156 | TLUI 60 | NANUQ (NANUK, NANOOK) | Two sod house ruins occupied by 2 families of reindeer herders, 4 storage pits, 2 sod quarries, dog tethers, and scattered historic debris. | Historic (AD 1920s) |
| HAR-157 | TLUI 45 | NIGLIVIK 2 | Sod house ruin, cache pit, sod quarry, and surface historic artifacts. | Historic |
| HAR-158 | TLUI 80 | PUTU | Two sod house ruins, sod quarry, 2 fish curing pits, ice cellar, whale boat stern, and artifacts. | Historic |
| HAR-00159 | | NUIQSAPIAQ (FIRST NUIQSUT, NUIQSUTPIAT) | Five sod house ruins, ice cellar, sod quarries, and wooden stakes (tethers), tenting area, historic debris. Original village of Nuiqsut people, until flooding (1930s) forced move to Niglinaat (HAR-160). | Historic |
| TES-003 | | TES-003 | Remains of a beached flat-bottomed, wood boat and hand axe (associated with the NARL cabin). | Historic |
| TES-006 | | TES-006 | Camp site with artifacts (e.g., 2 carved tent pegs, worked wood object, sawn antler, hammerstone, tin can, pottery paddle, chopped/cut wood fragments, scattered caribou bone). | Historic |
| TES-011 | | TES-011 | Isolated artifact-single-bladed kayak/boat paddle. | Historic |
| TES-013 | | TES-013 | Isolated bear canine tooth (sawn/drilled), hematite/iron oxide, and caribou bones. | Historic |
| TES-016 | | TES-016 | Isolated antler knife handle (2 small drilled holes and thin rectangular slot for metal blade). | Historic |
| TES-017 | | HORSE HEAD SITE | Two sod house ruins, a sod tent ring, 2 storage cellars, collapsed wood structure, mandible and skull of a Pleistocene horse, and historic debris. | Paleontological/ Historic |
| TES-018 | | TES-018 | Historic remains (e.g., cracked/sawn caribou bone, 2 chert flakes, Euro-american items). | Historic (AD 1900s) |
| TES-019 | | TES-019 | Tent ring structures marked by carved wooden stakes, sod blocks, and historic debris. | Historic (AD 1900s) |
| TES-021 | | TES-021 | Five fire pits surrounded by sod windbreaks, sail cloth fragments, charred willow/alder, and bone. | Historic |
| TES-022 | | | Umiak? remains. | Historic |
| TES-023 | | | Caribou kill site. | Historic |
| TES-026 | | NW PIK DUNE SITE BLM SITES | | Historic |
| TES-028 | | KOLOVIK | Trapping/trading location (e.g., standing houses, collapsed structures, 2 whaleboats, at least 4 surface burials). | Historic |
| TES-032 | | | Lonely Long Range Radar Site (LRRS; POW-1) DEW-line facilities. | Historic |
| TES-033 | | | Lonely LRRS (POW-1) DEW-line facilities. | Historic |
| TES-034 | | | Lonely LRRS (POW-1) DEW-line facilities. | Historic |
| TES-035 | | | Lonely LRRS (POW-1) DEW-line facilities. | Historic |
| TES-036 | | | Lonely LRRS (POW-1) DEW-line facilities. | Historic |

| AHRS NO. | OTHER NO.[1] | SITE NAME | DESCRIPTION | DATE/PERIOD |
|---|---|---|---|---|
| TES-037 | | | Lonely LRRS (POW-1) DEW-line facilities. | Historic |
| TES-038 | | | Lonely LRRS (POW-1) DEW-line facilities. | Historic |
| TES-039 | | | Lonely LRRS (POW-1) DEW-line facilities. | Historic |
| TES-040 | | | Lonely LRRS (POW-1) DEW-line facilities. | Historic |
| TES-041 | | | Lonely LRRS (POW-1) DEW-line facilities. | Historic |
| TES-042 | | | Lonely LRRS (POW-1) DEW-line facilities. | Historic |
| TES-043** | | | Lonely Short Range Radar Site (SRRS) road system [White Alice Communications (WACS), Aircraft Control & Warning (AC&W)]. | Historic |
| TES-044** | | | Lonely SRRS airfield [WACS, AC&W] | Historic |
| TES-045** | | | Lonely SRRS gravel pad system [WACS, AC&W]. | Historic |
| TES-046 | | | Sod houses. | Historic |
| TES-047 | | NW PIK DUNES SITE | | Historic |
| TES-048** | | POW-1 (LONELY) [DEW-LINE] | Auxiliary station of the DEW-line with train with rotating radar/support facilities, airstrip, pumphouse, warehouse, storage structures. | Historic (AD 1950s) |
| TES-049 | | IGSINAT (IGSINNAT) | | Historic |
| TES-050 | | IGSUGVIK (IKSUGVIK) | | Historic |
| TES-055 | | T78-2 | Regal pail. | Historic |
| TES-056 | | T78-3 | Caribou bones and shells. | Historic |
| UMI-007 | | | Sod house. | Historic |
| UMI-091 | | KIK RIVER | Three 4' willow poles (ax sharpened), and rock ringed hearth. | Historic |
| UMI-103 | | UMIAT NPR-4 TEST WELL 2 | | Historic |
| UMI-104 | | UMIAT NPR-4 TEST WELL 5 | | Historic |

[1] Multiple site numbers are provided in the AHRS database (e.g., TLUI, NSB CRSI, ROS).
* NHR (listed on the National Register of Historic Places).
** NRE (determined eligible for the National Register of Historic Places).
Source: Alaska Department of Natural Resources. 2004. *Alaska Heritage Resource Survey*. Division of Parks and Outdoor Recreation, Office of History and Archaeology.

# I.2 Documented Traditional Land Use Inventory Sites

| TLUI | TLUI (OLD)[1] | TLUI NAME | TRANSLATION | DESCRIPTION |
|---|---|---|---|---|
| TLUIHAR001 | | APALILVIK | | FISHING/HUNTING AREA. |
| TLUIHAR002 | | APALILVIUM KUUWA | APALILVIK RIVER. | FISHING/HUNTING AREA. |
| TLUIHAR003 | | UQALIUM KAWIBAWA | | FISHING/HUNTING AREA. OLD REINDEER HERDING CORRAL. |
| TLUIHAR004 | | TULUGAQ | TULUGAQ LAKE. | FISHING/HUNTING AREA. |
| TLUIHAR005 | | UQALIK | WITH A TONGUE. | FISHING/HUNTING AREA. |
| TLUIHAR006 | | INIBRUAT | | OLD RUINS. HUNTING AREA. |
| TLUIHAR007 | | NARVABAURAQ | A SMALL LAKE. | FISHING/HUNTING AREA. |
| TLUIHAR008 | | TULUKKAM KUUWA | TULUGAQ RIVER. | FISHING/HUNTING AREA. |
| TLUIHAR009 | | SIKULIUM PAAWA | ENTRY/MOUTH OF THE SIKULIK RIVER. | FISHING/HUNTING AREA. |
| TLUIHAR010 | | SIKULIUM KUUWA | SIKULIK RIVER. | FISHING/HUNTING AREA. |
| TLUIHAR011 | | SIKULIUM IGLUA | | CABIN. FISHING/HUNTING AREA. |
| TLUIHAR012 | | SIKULIUM NARVAWA | SIKULIK LAKE. | GRAVES/OLD RUINS. FISHING, CAMPING, HUNTING AREA. |
| TLUIHAR013 | TLUI 48 | NUYAPISUT | | DRIFTWOOD AREA. TRAPPING/ HUNTING AREA. |
| TLUIHAR014 | | KIPUTIT | | FISHING, TRAPPING, NESTING, HUNTING AREA. |
| TLUIHAR015 | | SAVIKPALIGAURAM IOITUBLIA | | OLD SOD HOUSE RUINS. FISHING/ HUNTING AREA. |
| TLUIHAR016 | TLUI 49 | SAKTUI | SAKTUI ISLANDS. | SOD HOUSE RUINS/GRAVE SITE. A TRADING POST ONCE OWNED BY EDWARDSEN (NOT IN OPERATION). TRAPPING/HUNTING AREA (CARIBOU/SEALS). |
| TLUIHAR017 | | AYUVIOAM IEUVIA | | GRAVESITE. HUNTING AREA. |
| TLUIHAR018 | | QAAQFIQ | | FISHING, CARIBOU/GEESE HUNTING AREA. |
| TLUIHAR019 | | QUUNBUQ | | FISHING/HUNTING AREA. |
| TLUIHAR020 | | KURRIUN | | FISHING/HUNTING AREA. |
| TLUIHAR021 | | KUUGRUK | KUUGRUK RIVER. | FISHING/HUNTING AREA. EIDER NESTING AREA. |
| TLUIHAR022 | | KUUGRUK | KUUGRUK RIVER. | FISHING/HUNTING AREA. EIDER NESTING AREA. |
| TLUIHAR023 | | AYUVIOA | PLACE NAME DERIVED FROM A PERSON. | HUNTING AREA. |
| TLUIHAR024 | | QUUNBUQ | | FISHING/HUNTING AREA. |
| TLUIHAR025 | | IKKALBUBRUAQ | | TWO GRAVES, 2 CELLARS, CABIN (1927). FISHING/GEESE HUNTING AREA. |
| TLUIHAR026 | | IKKALBUBRUAM NARVAWA | IKKALGUGRUAQ LAKE. | FISHING/HUNTING AREA. |
| TLUIHAR027 | | QITIQ | | HUNTING AREA. |

| TLUI | TLUI (OLD)[1] | TLUI NAME | TRANSLATION | DESCRIPTION |
|---|---|---|---|---|
| TLUIHAR028 | | ANNABUTCHIM KUUWA | ANNAGUTCHIQ RIVER. | FISHING/HUNTING AREA. |
| TLUIHAR029 | TLUI 46 | AKI (AGKI) | | SOD HOUSE RUINS. HUNTING, CAMPING, TRAPPING AREA. |
| TLUIHAR030 | | NIBLIVIGAURAM KUUBUURAWA | NIGLIVIGAURAQ CREEK. | FISHING/HUNTING AREA. |
| TLUIHAR031 | | NIBLIVIGAURAM NARVAWI | NIGLIVIGAURAQ LAKES. | FISHING, TRAPPING, GEESE/ CARIBOU HUNTING AREA. |
| TLUIHAR032 | | ITIVLIQPAK | A BIG PLACE TO CROSS OVERLAND. | |
| TLUIHAR033 | | NIBLIVIGAURAM NARVAWA | NIGLIVIGAURAQ (A PLACE WHERE WHITE-FRONTED GEESE ARE FOUND) LAKE. | FISHING/HUNTING AREA. |
| TLUIHAR034 | 379 | ISULIUMANIQ | | FISHING/HUNTING AREA. |
| TLUIHAR035 | | TIWMIAQPALIK | | FISHING, CARIBOU/GEESE HUNTING AREA. |
| TLUIHAR036 | | KUUGRUK | | FISHING/HUNTING AREA. EIDER NESTING AREA. |
| TLUIHAR037 | | IQALUAQPALIK | | FISHING, CARIBOU/GEESE HUNTING AREA. |
| TLUIHAR038 | | SAVIKPALIGAURAM IOITUBLIA | | SOD HOUSE RUINS. FISHING/ HUNTING AREA. |
| TLUIHAR039 | | SIKULIUM KUUWA | SIKULIK RIVER. | FISHING/HUNTING AREA. |
| TLUIHAR040 | | AYUVIOA | PLACE NAME DERIVED FROM A PERSON. | HUNTING AREA. |
| TLUIHAR043 | | UBIABNAM IOITUBLIA | | SOD HOUSE RUINS. FISHING, TRAPPING, HUNTING, CAMPING AREA. |
| TLUIHAR044 | | IKPITCHIAQ | A NEWLY FORMED HILL. | HUNTING AREA. |
| TLUIHAR045 | | NUNAM ISUA | THE END OF THE TUNDRA. | FISHING, TRAPPING, HUNTING AREA. |
| TLUIHAR047 | | PUBBIM PAAWA | MOUTH OF PUGGIQ BAY. | FISHING/HUNTING AREA. |
| TLUIHAR048 | | KAWITQUTCHAAM KUUWA | KANGITQUTCHAAK RIVER. | FISHING/HUNTING AREA. |
| TLUIHAR049 | | IKPITCHIAM PUBBIA | IKPITCHIAQ BAY. | FISHING/HUNTING AREA. |
| TLUIHAR051 | | UQSRUALUUM PAAWA | ENTRY/MOUTH OF THE UQSRUALUK RIVER. | FISHING, TRAPPING, HUNTING AREA. |
| TLUIHAR052 | | PUBBIQ | PUGGIQ LAKE. | FISHING/HUNTING AREA. |
| TLUIHAR053 | | IMAQPAK | A LITTLE LARGER THAN A SMALL BODY OF WATER. | FISHING/HUNTING AREA. |
| TLUIHAR054 | | IMAQPAURAQ | SMALL WATER. | FISHING/HUNTING AREA. |
| TLUIHAR055 | | UQSRUALUUM KUUWA | UQSRUALUK RIVER. | FISHING, TRAPPING, AND HUNTING AREA. |
| TLUIHAR057 | | QAUGAGUIQSAABVIK | LAST PLACE HUNTERS CAN BE ASSURED OF GETTING DUCKS. | A CEMETERY IS LOCATED AT THIS SITE. |
| TLUIHAR058 | | UQSRUALUUM NARVAWA | UQSRUALUK LAKE. | FISHING, TRAPPING, HUNTING AREA. |
| TLUIHAR059 | | | | NO DATA |
| TLUIHAR060 | | | | NO DATA |
| TLUIHAR061 | | | | NO DATA |
| TLUIHAR062 | | | | NO DATA |

| TLUI | TLUI (OLD)[1] | TLUI NAME | TRANSLATION | DESCRIPTION |
|---|---|---|---|---|
| TLUIHAR063 | | | | NO DATA |
| TLUIHAR064 | | | | NO DATA |
| TLUIHAR067 | | | | NO DATA |
| TLUIHAR068 | | | | NO DATA |
| TLUIHAR075 | | | | NO DATA |
| TLUIHAR077 | | | | NO DATA |
| TLUIHAR080 | | | | NO DATA |
| TLUIHAR086 | | | | NO DATA |
| TLUIHAR087 | | | | NO DATA |
| TLUIHAR088 | | | | NO DATA |
| TLUIHAR089 | | | | NO DATA |
| TLUIHAR090 | | | | NO DATA |
| TLUIHAR091 | | | | NO DATA |
| | TLUI 1 | UGIIN | | CABINS, SOD HOUSE RUINS, WINTER FURBEARER HUNTING. |
| | TLUI 4 | NIGLIGIAQ | | FISHING, FURBEARER/CARIBOU HUNTING AREA. |
| | TLUI 8 | IGLUPARAK | | FISHING AREA. |
| | TLUI 43 | SIKULIK | | CABINS, SOD HOUSE RUINS, GRAVES. FISHING AREA. |
| | TLUI 44 | IKALUURUAK | | CABIN, ICE CELLARS, GRAVES, FISHING, WINTER CARIBOU HUNTING AREA. |
| | TLUI 53 | KANGIGKUQ (KANGIGLUQ) | | SOD HOUSE RUINS, OLD FISH CAMP. FISHING/TRAPPING AREA. |
| | TLUI 54 | NIAQUQTURUQ | | SOD HOUSE RUINS. FISHING, DUCK HUNTING, BIRD NESTING AREA. |
| | TLUI 55 | NIKRUAPAITCH | | HUNTING, CAMPING, BIRD NESTING AREA. |
| | TLUI 61 | NUIQSUT | | GRAVES (CEMETERY). FISHING, TRAPPING, HUNTING, CAMPING AREA. CURRENT SITE FOR THE COMMUNITY OF NUIQSUT. |
| | TLUI 72 | ILLANIKRUAK, ILANNIK | | FISHING/TRAPPING AREA. |
| | TLUI 78 | KAYAKTUAGIAK | | FISHING, HUNTING, CAMPING AREA. |
| | TLUI 81 | ITTIGIAK, OCEAN POINT | | HUNTING/BERRY HARVESTING. |
| TLUIIKR019 | | IKPIKPAUM KUUWA | IKPIKPAK (FOOTHILLS) RIVER. | FISHING, TRAPPING, HUNTING AREA. |
| TLUIIKR021 | | QUBLUQTUM PAAWA | ENTRY/MOUTH OF THE QUGLUKTUQ RIVER. | FOSSIL MATERIAL. LANDMARK FOR PEOPLE TRAVELING FROM SMITH BAY TO HUNT CARIBOU. |
| TLUIIKR022 | | QUBLUQTUM KUUWA | QUGLUQTUQ RIVER. | A STOPOVER PLACE. CARIBOU HUNTING AREA. |

| TLUI | TLUI (OLD)[1] | TLUI NAME | TRANSLATION | DESCRIPTION |
|---|---|---|---|---|
| TLUIIKR023 | | IKPIKPAUM KUUWA | IKPIKPAK (FOOTHILLS) RIVER. | FISHING, TRAPPING, HUNTING AREA. |
| TLUIIKR024 | | SANNIWARUAQ | A RIVER FLOWING SIDEWAYS | MAJOR CARIBOU HUNTING AREA. PEOPLE CROSSED HERE TO BEGIN TRAVELING TO THE COLVILLE TO HUNT CARIBOU. |
| TLUIIKR026 | | IKPIKPAUM KUUWA | IKPIKPAK (FOOTHILLS) RIVER. | FISHING, TRAPPING, HUNTING AREA. |
| TLUIIKR038 | | QIRUIEAQ, BRONX CREEK | QIRUILAQ (PLACE WITHOUT WOOD) RIVER. | FISHING, TRAPPING, HUNTING AREA. |
| TLUIIKR051 | | | | NO DATA |
| TLUITES043 | | IMABRUAM AWMALUAQTUAQ | IMAGRUAQ LAKE. | THIS LAKE HAS DRIED UP AND IS A MUDDY SWAMP. HUNTING AREA. |
| TLUITES044 | | QIMIBABRUAQ | NAME GIVEN TO THE HIGH RIDGES. | HUNTING/TRAPPING AREA. |
| TLUITES045 | | TUQDUK | | FISHING/HUNTING AREA. |
| TLUITES047 | | NANUBAQTALIK | | FISHING, HUNTING, NESTING AREA. |
| TLUITES048 | | MAYUBIAM KUUWA, MIGUAKIAK RIVER | MAYUGIAQ (TO CLIMB OR CLIMB UP) RIVER. | PART OF AN INLAND ROUTE TO THE EAST. |
| TLUITES049 | | PIQQIM QIMIBAWIOOI | PIQQIQ HILLS. | HUNTING/NESTING AREA. |
| TLUITES050 | | NIBLIBAAM PAAWA | ENTRY/MOUTH OF NIGLIGAAQ (GOOSE) CREEK. | SUMMER FISHING, HUNTING, GOOSE NESTING AREA. |
| TLUITES051 | | NIBLIBAAM KUUBUURAWA | NIGLIGAAQ (GOOSE) CREEK. | SUMMER FISHING, HUNTING, GOOSE NESTING AREA. |
| TLUITES052 | | SUQDAK, SUQDAIT | | SOD HOUSE RUINS, ICE CELLARS. FISHING, TRAPPING, CARIBOU HUNTING AREA, NESTING AREA. |
| TLUITES054 | | KIMMITQUM KAWIQFUA | KIMMITQUQ BEND. | FISHING, TRAPPING, HUNTING AREA. |
| TLUITES055 | | AKDABAALUK | WHERE BROWN BEARS ROAM. | CABINS. FISHING, CARIBOU HUNTING, GEESE NESTING AREA. |
| TLUITES056 | | PIQQIM NARVAWA | PIQQIQ LAKE. | FISHING/HUNTING AREA. |
| TLUITES057 | | PIWUTUUM PAAWA | ENTRY/MOUTH OF THE PINGUTUUQ (PINGOS FOUND ALONG THE RIVER BANK) RIVER. | HUNTING/FISHING AREA. |
| TLUITES058 | | PIQQIQ | | HUNTING AREA. |
| TLUITES059 | | PIWUTUUM KUUWA | PINGUTUUQ (PINGOS FOUND ALONG THE RIVER BANK) RIVER. | HUNTING/FISHING AREA. |
| TLUITES060 | | QAUQTUM PAAWA | ENTRY/MOUTH OF QAUQTUQ LAKE. | FISHING, FOX TRAPPING, CARIBOU HUNTING AREA. |

| TLUI | TLUI (OLD)[1] | TLUI NAME | TRANSLATION | DESCRIPTION |
|---|---|---|---|---|
| TLUITES061 | | IKSUBVIUM QIKIQTAWA | IKSUGVIK ISLAND. | FISHING, TRAPPING, HUNTING AREA. |
| TLUITES062 | | QAUQTUM NARVAWA | QAUQTUQ LAKE. | FISHING, FOX TRAPPING, CARIBOU HUNTING AREA. |
| TLUITES063 | | MASRIIN | | FISHING/HUNTING AREA. |
| TLUITES064 | | IKSUBVIK | IKSUGVIK | MARKS SHOWING WHERE/HOW FAR COMPETITORS JUMPED DURING INUPIAT GAMES. FISHING, TRAPPING, HUNTING AREA. |
| TLUITES065 | | IKSUBVIUM KUUWA | IKSUGVIK RIVER. | FISHING, TRAPPING, HUNTING AREA. |
| TLUITES066 | | TUPQUTAAM KUUWA | TUPQUTAAQ RIVER. | FISHING, TRAPPING HUNTING AREA. |
| TLUITES067 | | KUYAPIGAM NUVUA | KUYAPIGAQ POINT. | FISHING, TRAPPING HUNTING AREA. |
| TLUITES068 | | KUYAPIGAQ | | FISHING, TRAPPING, HUNTING AREA. |
| TLUITES069 | | QIKIQTAQ | AN ISLAND. | HUNTING, FISHING, TRAPPING AREA. |
| TLUITES070 | | KIGEAVAIT NUVUA | KIGLAVAIT POINT. | HUNTING AREA. |
| TLUITES071 | | KIGEAVAIT IOITUBLIA | | RUINS. HUNTING, CAMPING AREA. |
| TLUITES072 | | KIGEAVAIT KUUWA | KIGLAVAIT RIVER. | FISHING/HUNTING AREA. |
| TLUITES073 | | PIWUBRUK | PINGUGRUK RIVER. | FISHING/HUNTING AREA. |
| TLUITES074 | | KUUPADDUK | A BAD RIVER. | LONG AGO, INUPIAT PEOPLE CAMPED AT THIS SITE AND WERE ATTACKED BY INDIANS. |
| TLUITES075 | | IKPIKPAGRUAM KUUWA KIVALLIQ | EAST IKPIKPAGRUAQ (LARGE FOOTHILLS) RIVER. | FISHING, TRAPPING, HUNTING ALONG THE RIVER. |
| TLUITES077 | | IKPIKPAGRUAM KUUWA KIVALLIQ | EAST IKPIKPAGRUAQ (LARGE FOOTHILLS) RIVER. | FISHING, TRAPPING, HUNTING ALONG THE RIVER. |
| TLUITES078 | | PIWUGRUUM PAAWA | ENTRY/MOUTH OF THE PINGUGRUK (HIGH MOUND/HILL) RIVER. | FISHING, TRAPPING, CARIBOU HUNTING AREA. |
| TLUITES079 | | PITTABRUAQ | PITTAGRUAQ LAKE. | CARIBOU PASS THROUGH THIS LAKE DURING THEIR ANNUAL MIGRATION. |
| TLUITES080 | | PIWUBRUUM KUUWA | PINGUGRUK (HIGH MOUND/HILL) RIVER. | FISHING, TRAPPING, CARIBOU HUNTING AREA. |
| TLUITES082 | | SIBVAN | | DOME (100+ FT ABOVE SEA LEVEL). IMPORTANT LANDMARK FORMS PART OF THE RIDGE SYSTEM (QUAGRUGAGRUAQ). |
| TLUITES083 | | TABBAQ | A SHADOW OR REFLECTION (E.G., A MIRROR). | ROUND BLUFF WITH OPENING ON ONE END - NATURAL CORRAL USED BY REINDEER HERDERS. |
| TLUITES084 | | IKPIKPAGRUAM KAYYAAK | TES | MAJOR HUNTING, FISHNG, TRAPPING AREA. |

| TLUI | TLUI (OLD)[1] | TLUI NAME | TRANSLATION | DESCRIPTION |
|---|---|---|---|---|
| TLUITES085 | | IEAVGAWALUK | PLACE NAME DERIVED FROM A PERSON. | OLD RUINS (E.G., CELLAR, SOD HOUSE). FISHING AREA. |
| TLUITES086 | | TAQTU | PLACE NAME DERIVED FROM A PERSON. | DOME (160+ FT ABOVE SEA LEVEL). IMPORTANT LANDMARK. |
| TLUITES087 | | KIGALASAK | | HUNTING/CAMPING AREA. |
| TLUITES088 | | ISULIUMANIQ | | CARIBOU CROSSING AREA |
| TLUITES089 | | AQSIIO | PLACE NAME DERIVED FROM A PERSON. | DOME (150+ FT ABOVE SEA LEVEL). |
| TLUITES090 | | NUISATCHIQ | NUISATCHIQ HILL. | MOSQUITOES DURING THE SUMMER - CARIBOU MIGRATION ROUTE. HUNTING AREA. |
| TLUITES091 | | ASUAQ | | HISTORIC CAMP SITE. FISHING, HUNTING, CAMPING, BLUEBERRY HARVEST AREA. |
| TLUITES092 | | QIUKKAM IMAWA | PLACE NAME DERIVED FROM A PERSON. | HUNTING AREA. |
| TLUITES094 | | UBVIK | A PLACE TO TURN A BOAT UPSIDE DOWN AND LEAN IT AGAINST SOMETHING. | LANDMARK (FOUR CORNERS OF A HILL). HISTORIC REMAINS. FISHING AREA (BROAD WHITEFISH AND GRAYLING). TRAPPING AREA. |
| TLUITES095 | | IBIOBAATKUT IOITUBLIA | | OLD RUINS. FISHING, TRAPPING, CARIBOU/GEESE HUNTING AREA. |
| TLUITES096 | | AYABAAT, AYAQHAAT | AYAGAAT AND AYAQHAAT LAKES. | FISHING, CARIBOU/GEESE HUNTING AREA. |
| TLUITES097 | | AKIQPAK | | CAMPING SITE, POSSIBLE BURIAL SITE. PEOPLE WINTERED HERE IN THE PAST. FISHING, TRAPPING, HUNTING AREA. |
| TLUITES099 | | ULUABRUUM NATIBNAWA | ULUAGRUK FLATLAND. | HUNTING AREA. GOOSE FEEDING GROUNDS. |
| TLUITES100 | | QIATUNA | QIATUNA LAKE. | FISHING/HUNTING AREA. |
| TLUITES101 | | ITVLIURAQ | A SMALL CROSSING AREA. | FISHING/HUNTING AREA. |
| TLUITES102 | | ULUABRUK | | CABIN (NSB DWM). FISHING, TRAPPING, CARIBOU/GOOSE HUNTING AREA. |
| TLUITES103 | | QAVIARAT | FINE SAND. | OLD NARL CABIN. GOOSE HUNTING AREA. FISHING, TRAPPING, HUNTING AREA. |
| TLUITES104 | | ABNAQSAQ | AGNAQSAQ LAKE. | FISHING/HUNTING AREA. |
| TLUITES105 | | KUVRABLIQ | A PLACE TO PUT OUT A FISH NET. | FISHING/HUNTING AREA. |
| TLUITES106 | | QAVIARAT NUVUA | QAVIARAT (FINE SAND) | FISHING, TRAPPING, |

| TLUI | TLUI (OLD)[1] | TLUI NAME | TRANSLATION | DESCRIPTION |
|---|---|---|---|---|
| | | | HILL. | HUNTING AREA. |
| TLUITES107 | | KIMMITQUM KUUBUURAWA | KIMMITQUQ CREEK. | FISHING, TRAPPING, HUNTING AREA. |
| TLUITES108 | | QAVIARAT | FINE SAND. | FISHING/HUNTING AREA. |
| TLUITES109 | | AMIEBUBRUAM NUVUA | AMILGUGRUAQ POINT. | HUNTING AREA. |
| TLUITES110 | | SIWIGRUAQ | SINGIGRUAQ POINT. | FISHING/HUNTING AREA. |
| TLUITES111 | | AMIEBUBRUAQ | | HUNTING AREA. |
| TLUITES112 | | KUUGAALBIT | | FISHING/HUNTING AREA. |
| TLUITES113 | | ISUA | THE END OF SOMETHING. | HUNTING AREA. |
| TLUITES114 | | SIWIBRUAM AKIEEIA, MAURVIUM NUVUA, TAGLIM NUVUA | MAURVIK AND TAGLI POINT. SECOND SINGIGRUAQ POINT. | FISHING, GEESE/CARIBOU HUNTING AREA. |
| TLUITES115 | | TAGLIM PAAWA | ENTRY/MOUTH OF THE TAGLI RIVER. | FISHING (BROAD WHITEFISH, LEAST CISCO, LAKE TROUT/CHAR), GEESE/CARIBOU HUNTING AREA. |
| TLUITES116 | | QIMMIT NALLUATA PAAWA | QIMMIT NALLUAT RIVER ENTRY/MOUTH. | FISHING/HUNTING AREA. |
| TLUITES117 | | TAGLI | | FISHING (BROAD WHITEFISH, LEAST CISCO, LAKE TROUT/CHAR), CARIBOU/GEESE HUNTING AREA. FISHING TRAIL. |
| TLUITES118 | | QIMMIT NALLUATA KUUWA | QIMMIT NALLUAT RIVER. | FISHING, TRAPPING/HUNTING AREA. |
| TLUITES119 | | NIEEUVIK | | FISHING/HUNTING AREA. |
| TLUITES120 | | SAQDAK | TO HOLLER OR YELL. | FISHING/HUNTING AREA. |
| TLUITES121 | | ALABIM NUVUA UALLIQ | WEST ALAGI POINT. | HUNTING AREA. |
| TLUITES122 | | ALABIMLU UYABALIUMLU NUVUA | ALAGI AND UYAGALIK POINT. | HUNTING AREA. |
| TLUITES123 | | NIAQUQTUABRUUM | | HUNTING AREA. |
| TLUITES124 | | QAYAUVIUM KUUWA | QAYAUVIK RIVER. | FISHING/HUNTING AREA. |
| TLUITES125 | | UYABALIGUM NUVUA | UYAGALIK POINT. | FISHING/HUNTING AREA. |
| TLUITES126 | | ALABIM KAWIQFUA | ALAGI BEND. | FISHING/HUNTING AREA. |
| TLUITES127 | | UYABALIGUM IEULIAWA | UYAGALIK BAY. | FISHING/HUNTING AREA. |
| TLUITES128 | | QAYAUVIK | PLACE TO GO BOATING WITH A QAYAQ. | FISHING/CARIBOU HUNTING AREA. |
| TLUITES129 | | MAURVIUM KUUWA | MAURVIK RIVER. | FISHING, TRAPPING, HUNTING AREA. |
| TLUITES130 | | MAURVIUM IEULIAWA | MAURVIK BAY. | FISHING/HUNTING AREA. |
| TLUITES131 | | MAURVIUM IGLUBRAUWI | | RUINS. FISHING, TRAPPING, CAMPING, HUNTING AREA. |
| TLUITES132 | | TAGLI | | FISHING (BROAD WHITEFISH, LEAST CISCO, LAKE TROUT), CARIBOU/GEESE HUNTING AREA. FISHING TRAIL. |

| TLUI | TLUI (OLD)[1] | TLUI NAME | TRANSLATION | DESCRIPTION |
|---|---|---|---|---|
| TLUITES133 | | UYABALIK | | CABIN, SOD HOUSE RUINS, ICE CELLAR. FISHING, TRAPPING, HUNTING AREA. |
| TLUITES134 | | UYABALIGUM KUUWA | UYAGALIK RIVER. | FISHING/HUNTING AREA. |
| TLUITES135 | | ALABI | | OLD RUIN. SHAMAN STORY. FISHING/HUNTING AREA. |
| TLUITES136 | | KAYYAAK | SPLIT BETWEEN RIVERS. | FISHING, TRAPPING, HUNTING AREA. |
| TLUITES137 | | KAMA | | OLD GRAVE. FISHING/HUNTING AREA. |
| TLUITES138 | | UYABALIGUM NARVAWA | UYAGALIK LAKE. | FISHING AREA. |
| TLUITES139 | | KAMAM NARVAWA | KAMA LAKE. | FISHING/HUNTING AREA. |
| TLUITES140 | | TAGLIM SAQUUBUUTAA | A BEND IN THE TAGLI RIVER. | FISHING, TRAPPING, HUNTING AREA. |
| TLUITES141 | | TAGLIM SAQUUBUUTAA | A BEND IN THE TAGLI RIVER. | FISHING, TRAPPING, HUNTING AREA. |
| TLUITES142 | | TAGLI | | FISHING (BROAD WHITEFISH, LEAST CISCO, LAKE TROUT), CARIBOU/GEESE HUNTING AREA. FISHING TRAIL. |
| TLUITES143 | | NALLUBRUAQ | NALLUGRUAQ SAND DUNES. | CARIBOU/GEESE HUNTING AREA. |
| TLUITES144 | | ANABI | ANAGI LAKE. | FISHING AREA. |
| TLUITES145 | | TAGLI | | FISHING (BROAD WHITEFISH, LEAST CISCO, LAKE TROUT/CHAR), CARIBOU/GEESE HUNTING AREA. FISHING TRAIL. |
| TLUITES146 | | NALLUBRUAQ | NALLUGRUAQ SAND DUNES. | CARIBOU/GEESE HUNTING AREA. |
| TLUITES147 | | SIGGUYUGRUAQ | SIGGUYUGRUAQ LAKE. | FISHING, CARIBOU/GEESE HUNTING AREA. |
| TLUITES148 | | TAKKAUM IOITUBLIA | PLACE NAME DERIVED FROM A PERSON. | SOD HOUSE RUINS. REINDEER CORRAL. FISHING, CARIBOU, GEESE HUNTING AREA. |
| TLUITES149 | | QIWAQTAM IOITUBLIA | PLACE NAME DERIVED FROM A PERSON. | SOD HOUSE RUINS. FISHING, CARIBOU/GEESE HUNTING AREA. |
| TLUITES150 | | UVLUTUUQ | UVLUTUUQ RIVER. | FISHING, CARIBOU, GEESE HUNTING AREA. |
| TLUITES151 | | UVLUTUUQ | UVLUTUUQ RIVER. | FISHING, CARIBOU AND GEESE HUNTING AREA. |
| TLUITES152 | | INIKAAK | INIKAAK RIVER. | PILE OF ANTLERS. FISHING, TRAPPING, CARIBOU/GEESE HUNTING AREA. |
| TLUITES202 | | IMABRUAM IKPIGRUAWA | IMAGRUAQ HILL. | HUNTING AREA. |
| TLUITES205 | | IMABRUAM PAAWA | ENTRY/MOUTH OF THE IMAGRUAQ RIVER. | THIS RIVER HAS DRIED UP. OLD HUNTING/FISHING AREA. |
| TLUITES207 | | NUNAM ISUA | | HUNTING AREA. |
| TLUITES208 | | IPIIQSAUN | | FISHING, HUNTING, NESTING AREA. |

| TLUI | TLUI (OLD)[1] | TLUI NAME | TRANSLATION | DESCRIPTION |
|---|---|---|---|---|
| TLUITES211 | | IMABRUAM KUUWA | IMAGRUAQ RIVER. | THS RIVER HAS DRIED UP. HUNTING AREA. |
| TLUITES212 | | AMIEBUGIIK | | FISHING/HUNTING AREA. |
| TLUITES215 | | NALLUQ | | HUNTING AREA. |
| TLUITES216 | | AYAGUTAQ | | HUNTING AREA. |
| TLUITES217 | | NALLUABRUUM PAAWA | ENTRY/MOUTH OF THE NALLUAGRUK RIVER. | FISHING/HUNTING AREA. |
| TLUITES218 | | SISAMALIK | | HUNTING AREA. |
| TLUITES219 | | KUUGRUAGAABRUK | | FISHING/HUNTING AREA. |
| TLUITES220 | | TASIABRUK | | FISHING/HUNTING AREA. |
| TLUITES222 | | QALLUVIK | | STANDING/COLLAPSED HOUSES, 2 WHALE BOATS. LARGE POPULATION (1930s). |
| TLUITES223 | | QIMIGAYUK | NAME REFERS TO THE FOOTHILLS. | FISHING/HUNTING AREA. |
| TLUITES225 | | NATIBNAURAQ | SMALL FLAT LAND. | HUNTING AREA. |
| TLUITES226 | | KIWIOWUQ | | HUNTING AREA. |
| TLUITES227 | | QIRUKTABIAQ | A PLACE TO GO COLLECT DRIFTWOOD FOR SHELTER/FUEL. | HUNTING AREA. |
| TLUITES229 | | IGLUQABVIALUK | | OLD HOUSES. FISHING/HUNTING AREA. |
| TLUITES230 | | TIGUTAAM PAAWA | ENTRY/MOUTH OF THE TIGUTAAQ RIVER. | FISHING/HUNTING AREA. |
| TLUITES232 | | QAGGAQ | QAGGAQ LAKE. | FISHING/HUNTING AREA. |
| TLUITES233 | | KUVRABLIQ | PLACE TO PUT OUT NET. | FISHING/HUNTING AREA. |
| TLUITES235 | | NALUABRUUM KUUWA | NALLUAGRUK RIVER. | FISHING/HUNTING AREA. |
| TLUITES236 | | MITITUAM KUUBUURAWA | MITITUAQ CREEK. | FISHING/HUNTING AREA. |
| TLUITES237 | | KIOAVIAQ | PLACE NAME DERIVED FROM A PERSON. | OLD HUNTING/CAMPING AREA. |
| TLUITES238 | | TIGUTAAM KUUWA | TIGUTAAQ RIVER. | FISHING/HUNTING AREA. |
| TLUITES239 | | NALLUABRUK AWMALUAQTUAQ | NALLUAGRUK LAKE. | LAKE HAS DRIED UP AND IS A MUDDY SWAMP. HUNTING AREA. |
| TLUITES240 | | NALLUABRUK | NALLUAGRUK LAKE. | FISHING/HUNTING AREA. |
| TLUITES241 | | AKUVAAM IOITUBLIA | PLACE NAME DERIVED FROM A PERSON. | SOD HOUSE RUINS. FISHING, HUNTING AREA. |
| TLUITES242 | | UQALIK | WITH A TONGUE. | FISHING/HUNTING AREA. |
| TLUITES243 | | YUGAARIQ | PLACE NAME DERIVED FROM A PERSON. | GRAVE SITE. HUNTING AREA. |
| TLUITES244 | | TIGUTAAQ | TIGUTAAQ LAKE. | FISHING/HUNTING AREA. |
| TLUITES245 | | IMABRUAQ | BIG WATER. | OLD SOD HOUSES (ERODED), GRAVE. |
| TLUITES246 | | IGLIBAQ | IGLIGAQ LAKE. | FISHING, TRAPPING, HUNTING AREA. |
| TLUITES247 | | NARVAQ | LAKE. | FISHING/HUNTING AREA. |
| TLUITES249 | | | | NO DATA |
| TLUITES250 | | | | NO DATA |
| TLUITES251 | | | | NO DATA |
| TLUITES252 | | | | NO DATA |

| TLUI | TLUI (OLD)[1] | TLUI NAME | TRANSLATION | DESCRIPTION |
|---|---|---|---|---|
| TLUITES253 | | | | NO DATA |
| TLUITES254 | | | | NO DATA |
| TLUIUMI002 | | | | NO DATA |
| TLUIUMI005 | | | | NO DATA |
| TLUIUMI008 | | | | NO DATA |

[1] Many TLUI sites have identifying numbers from two different number systems: one used in the 1970s (TLUI [old]) (Hoffman et al. 1988) and one developed later (North Slope Borough 2003).

Sources: Hoffman, D., D. Libbey, and G. Spearman. 1988. *Nuiqsut: Land Use Values Over Time in the Nuiqsut Area.* North Slope Borough and the Anthropology and Historic Preservation Section of the Cooperative Park Studies Unit Occasional Paper No. 12. University of Alaska, Fairbanks, Alaska; NSB. 2003. Unpublished Subsistence Survey Data. North Slope Borough, Division of Wildlife Management, Barrow, Alaska.

# APPENDIX J

# SUBSISTENCE

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# APPENDIX J

# SUBSISTENCE

## J.1 Introduction

This section describes the subsistence-harvest patterns of the Iñupiat (Eskimo) communities adjacent to the Planning Area—Barrow, Atqasuk, Nuiqsut, and Anaktuvuk Pass. This community-by-community description provides general information on subsistence harvest patterns, harvest information by resource and community, timing of the subsistence harvest cycles, and harvest area concentrations by resource and by community. The following text was compiled from subsistence sections included in the 1998 Northeast and Northwest IAPs/EISs (USDOI BLM and MMS 1998, 2003) and the *Alpine Satellite Development Plan EIS* (USDOI BLM 2004). This material has been edited and updated with newer information where possible.

Data sources for this section included subsistence resource reports published by: 1) the NSB Department of Wildlife Management and the ADFG, Division of Subsistence; 2) unpublished and published harvest data from these agencies; 3) technical reports published by the MMS; 4) ethnographic and historical literature; 5) relevant correspondence between Iñupiat organizations and agencies (e.g., Kuukpik Corporation 2002); and 6) the results of field interviews (Stephen R. Braund & Associates [SRBA] 2003b). For quantitative measures of use, the best available and/or most recent subsistence harvest data were acquired from ADFG, NSB and MMS reports. These data included information about the number and amount of subsistence species harvested, the location and timing of subsistence harvests, the extent of past and present subsistence land use, and the cultural importance of subsistence uses. Historical and ethnographic literature from academic and historical sources, both published and unpublished, provided additional qualitative data about the use and social context of subsistence resources in the recent past. Fieldwork information, derived from key informant interviews conducted for the *Alpine Satellite Development Plan EIS* (SRBA 2003b, USDOI BLM 2004), provides additional information about subsistence resource use and harvest areas in the present and the recent past.

Iñupiat concerns about oil development in the National Petroleum Reserve – Alaska that were identified during scoping, and those identified in public outreach for recent OCS actions and the Northstar Project, can be divided into eight categories: 1) disruption of migrating subsistence species; 2) direct damage to or contamination of subsistence resources and habitats; 3) disruption of access to subsistence areas; 4) loss of Native food; 5) degradation of traditional Iñupiat places; 6) concern over cumulative oil-development impacts (especially in the community of Nuiqsut); 7) insufficient recognition of Iñupiat indigenous knowledge about subsistence resources, subsistence-harvest areas, and subsistence practices; and 8) damage to Iñupiat culture. One analysis of Iñupiat concerns about oil development was based on approximately 10 years of recorded testimony at North Slope public hearings for state and federal energy development projects (Kruse et al. 1983). The majority of concerns focused on the subsistence use of resources, including damage to subsistence species, loss of access to subsistence areas, loss of Native foods, and interruption of subsistence species migration. These four concerns represented 83 percent of all concerns expressed during testimony taken on the North Slope (Kruse et al. 1983; IAI 1990; Human Relations Area Files, Inc. [HRAF] 1992; USDOI MMS 1994). Further statements recorded during scoping for the Amended IAP/EIS included concerns that subsistence cabins and camps, access, and resources would not be adequately protected by the performance-based ROPs and stipulations. The communities' general perceptions were that stipulations negotiated in cooperation with local communities and agencies as part of the 1998 Northeast IAP/EIS, and in place for only a few years and currently untested, were being abandoned, or reduced, by the BLM.

## J.2 Subsistence Defined

The Planning Area is comprised of federal land administered by the BLM. Therefore, management of subsistence hunting in the Planning Area is ruled by Title VIII of the ANILCA, which defines subsistence as:

> the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of inedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing for personal or family consumption; and for customary trade (16 U.S.C. § 3113).

On federal lands in Alaska, federal law grants subsistence priority over other uses, and federal agencies manage these hunts, and will continue to do so, until state law is compliant with federal regulations (USDOI USFWS 1992). Subsistence fisheries on federal lands are managed by the USDOI (Hulen 1996a, b; Kizzia 1996; Whitney 1996).

The NSB Municipal Code defines subsistence as:

> an activity performed in support of the basic beliefs and nutritional needs of the residents of the borough and includes hunting, whaling, fishing, trapping, camping, food gathering, and other traditional and cultural activities (NSB Municipal Code 19.20.020 [67]).

For Alaska Natives, subsistence is more than the harvesting, processing, sharing, and trading of marine and land mammals, fish, and plants. It embodies cultural, social, and spiritual values—the essence of Alaska Native cultures (Bryner 1995, ADNR 1997). The Alaska Federation of Natives (2003) describes subsistence as:

> the hunting, fishing, and gathering activities which traditionally constituted the economic base of life for Alaska's Native peoples and which continue to flourish in many areas of the state today.... Subsistence is a way of life in rural Alaska that is vital to the preservation of communities, tribal cultures, and economies. Subsistence resources have great nutritional, economical, cultural, and spiritual importance in the lives of rural Alaskans....Subsistence, being integral to our worldview and among the strongest remaining ties to our ancient cultures, is as much spiritual and cultural, as it is physical.

Subsistence resources are highly valued and central to the customs and traditions of many cultural groups in Alaska, including the North Slope Iñupiat. These customs and traditions encompass sharing and distribution networks, cooperative hunting, and fishing, and ceremonial activities. Subsistence fishing and hunting are important sources of nutrition and non-traditional employment in almost all rural Alaskan communities. The ADFG estimates that the annual wild food harvest in Alaska's Arctic area is approximately 10,507,255 pounds, or 516 pounds of food per person per year (ADFG 2000). It is important to remember, however, that subsistence harvest levels vary widely from one community to the next.

Subsistence is part of a rural economic system, called a mixed subsistence-market economy, wherein families invest money into small-scale, efficient technologies to harvest wild foods (ADFG 2000). Fishing and hunting for subsistence provide a reliable economic base for many rural regions, and domestic family groups invest in gill nets, motorized skiffs, and snowmachines to conduct these important activities. Subsistence is not oriented toward sales, profits, or capital accumulation (commercial market production), but is focused toward meeting the self-limiting needs of families and small communities. Participants in this mixed-economy augment their subsistence production by cash employment. Cash (from commercial fishing, trapping, and/or wages from public sector employment, construction, fire fighting, oil and gas industry, or other services) provides the means to purchase the equipment, supplies, and gas used in subsistence activities. The combination of subsistence and commercial-wage activities provides the economic basis for the way of life so highly valued in rural communities (Wolfe and Walker 1987). As one North Slope hunter observed, "The best mix is half and half. If it was all subsistence, then we would have no money for snowmobiles and ammunition. If it was all work, we would have no Native foods. Both work well together (ACI et al. 1984). "

Full-time, year-round wage employment has both positively and negatively affected the pursuit of subsistence resources. The subsistence hunt provides cash for snowmachines, boats, motors, fuel, equipment, and ammunition

required for the hunt; however, full-time, year-round employment limits the time a subsistence hunter can spend hunting. Employment in the oil fields, or away from the communities, further limits the pursuit of subsistence resources, as the primary hunters may be working during the best harvest times. During the summer, extensive hunting and fishing activities can be pursued after work without any light limitation, and travel is limited to raised ground and waterways because of the difficulty associated with traveling on wet tundra. Speaking at the 2001 meeting in Nuiqsut for the Liberty Development and Production Plan Draft Environmental Impact Statement, Rosemary Ahtuangaruak, then-acting mayor of the community, stated: "[Alaskan Natives] require the guns and the snowmachines to allow them to harvest in the narrow windows of time that exist due to commitment to work. They are torn by the traditional needs of providing from the land and the stresses of needing cash to purchase items that save on time (USDOI MMS 2001)."

## J.3 Annual Cycle of Harvest Activities

The primary subsistence-harvest areas in the Northeast National Petroleum Reserve – Alaska are shown in Map J-1. Seasonal movement to hunting sites and camps for subsistence activities involves travel over, and use of, extensive areas, ranging from 70 miles offshore to the Brooks Range mountains.

Barrow and its environs have a long and continuous history of use and occupation by Iñupiat hunters, as evidenced by numerous archaeological deposits. Atqasuk and Nuiqsut were seasonally-occupied traditional subsistence use areas, recently reestablished as sedentary villages as people returned from Barrow, where they had moved after World War II, to places where they had historic connections. Knowledge of the land and the availability of subsistence resources were part of the historic connections (IAI 1990). This section describes subsistence use for the communities of Barrow, Atqasuk, Nuiqsut, and Anaktuvuk Pass during past and present times. The proposed amendment could affect the areas used for subsistence activities, both within and near the Planning Area.

## J.4 Community Subsistence Harvest Patterns

Subsistence resources are often harvested from specific camps, where multiple resource harvest opportunities are available seasonally. In general, communities harvest resources nearest to them; however, harvest activities could occur throughout the Planning Area. Harvests tend to be concentrated near communities and along productive rivers and coastlines. It is a complex problem to determine where and when a subsistence resource can be harvested, given the distribution, migration, and seasonal and cyclical variation of animal populations. Harvest areas that are used infrequently could still be quite important (USDOI BLM 1978).

Species use and harvest success can vary greatly over short periods of time, thus short-term harvest data can be misinterpreted. For example, if a community did not harvest a bowhead whale, an increase in caribou and other species harvests would compensate for the lack of the whale resources. If caribou were not available one winter, other marine and terrestrial species would be hunted with greater intensity. Similar scenarios have taken place in Kaktovik and Nuiqsut in the last 25 years (Brower and Hepa 1998). In these cases, the cultural value of sharing and reciprocity ensures that other communities contribute subsistence foods to the communities affected by the lack of a certain resource. In one case, the Anaktuvuk Pass and Nuiqsut communities sponsored hunts for the other community suffering a harvest failure (SRBA 2003b). The reliance on household survey data for estimates of subsistence resource use could underestimate actual harvests as well as impacts to these harvests. While the data may suggest the extent of an area that is being used, it does not indicate how Nuiqsut's residents have adjusted or will adjust to the Alpine field or the other recent development near the village. Household surveys also may not address people who harvest in a wide geographic area. However, household surveys provide the best available data at this time.

Bowhead whales, caribou, and fish are the main subsistence resources for Barrow, Nuiqsut, and Atqasuk, although subsistence resource harvests differ between communities. Bowhead whale hunting, which requires a great deal of cooperation and year-round preparation, is the impetus and focus of the Iñupiat sociocultural system. The bowhead whale is the preferred meat and the subsistence resource of primary importance, because it provides a unique and

powerful cultural basis for sharing and community cooperation (Stoker 1983 in ACI and SRBA 1984). In terms of the number of animals harvested and consumed, and the large number of hunting trips, however, caribou is the most important overall subsistence resource. Depending on the community, fish is the second or third most important resource, after caribou and bowhead whales. Bearded seals and waterfowl are also considered primary subsistence species. Bearded seal meat, oil (used as a condiment), and hides are important staples and necessary complements to other subsistence foods, while waterfowl are important during the spring, when they provide the season's first fresh meat and add variety to the subsistence diet. Migratory birds from the project area are important to Native peoples in western, southwestern, and interior Alaska and to people along the Pacific Flyway. In the late 1970s, when bowhead whale quotas were low and the WAH caribou suffered a severe population decline, the Alaska Board of Game placed restrictive harvest limits on these resources. In response, Iñupiat subsistence hunting efforts switched to bearded seals, ducks, geese, and fish. Atqasuk had only indirect access to bearded seals, resulting in the harvest of more ducks, geese, and fish (Schneider et al. 1980).

Whaling continues to be the most valued activity in the subsistence economy of the communities, even in light of harvest constraints imposed by International Whaling Commission quotas. Barrow is the only community within the area that harvests whales in both the spring and the fall, while Nuiqsut only harvests during the fall; however, some Nuiqsut hunters travel to Barrow to participate with Barrow whaling crews during the spring (NSB 1998). The subsistence use of bowhead whales is important to the communities of Barrow and Nuiqsut, as well as to the few Atqasuk men who whale with Barrow or Wainwright crews. The sharing of whale maktak and meat is also important to inland communities. Seasonally and plentiful supplies of other subsistence resources, such as caribou and fish, as well as retail grocery foods, supplement and support whale harvests. Whaling traditions, such as kin-based crews, use of skin boats in Barrow for their spring whaling season, onshore preparations for distribution of the meat, and regional participation and sharing remain the central values and activities for Iñupiat in the North Slope communities. Bowhead whaling strengthens family and community ties, adds to the sense of a common Iñupiat heritage, culture, and way of life, and provides strength, purpose, and unity in the face of rapid change.

## J.5 Traditional Iñupiat Settlement Patterns and Subsistence Use Areas

The ACP has been occupied by various groups as far back as 12,000 years ago, based on evidence from archaeological sites such as the Mesa site (Kunz and Mann 1977). Beginning 4,000 years ago, the Barrow area supported several seasonal villages. Approximately 1,300 years ago, the Iñupiat began continuous year-round occupation of the Barrow area. Archaeologists have connected this period of continuous occupation to the beginning of whaling and the development of semi-permanent coastal communities (SRBA and Institute of Social and Economic Research [ISER] 1993).

The North Slope Iñupiat have undergone numerous changes as they adapted to changing cultural, social, and physical environments. Before sustained contact with Euro-Americans, the Iñupiat moved seasonally between coastal and riverine environments on the ACP, gathering at communally recognized locations for bowhead whale hunts or cooperative caribou hunts. If the whale harvest was successful, the meat and maktak were distributed, and a celebration, called Nalukataq, was held. After the whaling, Iñupiat would disperse to coastal and riverine winter residences (SRBA and ISER 1993). Additionally, numerous regional groups of Iñupiat and Athabaskans gathered at trading fairs, including one in the Nuiqsut area (Elavgak in Brown 1979).

The Iñupiat developed adaptive strategies, both sociocultural and technological, to the variable distribution and availability of subsistence resources. Sociocultural strategies included an emphasis on sharing and hospitality, non-restrictive land use rules, wide-ranging mobility to extract sparsely distributed resources, and an adaptive set of hunting rules (e.g., allowing caribou herd leaders to pass and taking only as many caribou as necessary) and techniques (e.g., drivelines for caribou hunting and breathing holes for seal hunting). Technological strategies included specialized tools, innovation of new materials (e.g., steel, plastic, and woven fabrics), and adoption of useful and new technologies from other cultures (e.g., rifles, outboard motors, snowmachines; Brown 1979, IAI 1990).

Euro-American contact began intermittently in the early 19th century and intensified with the shift from commercial whaling north of the Bering Strait in the 1850s. In 1884, the establishment of a shore-based whaling station at Barrow brought Iñupiat from other areas, in pursuit of wage employment, access to technologically advanced trade goods, and increased trade opportunities. Eskimo people from as far as Siberia and Saint Lawrence Island moved to Barrow to participate in the commercial whale harvest. After the Pacific Steam Whaling Company ceased shore-based whaling in Barrow in 1896, Iñupiat whalers took over the shore-based whale harvest, with wealthier captains maintaining as many as six crews year-round (SRBA and ISER 1993).

Changes in resource distribution, fluctuations in whale and caribou populations, epidemic disease, and prolonged contact with Euro-Americans caused major changes in the geographic distribution and lifestyles of the Iñupiat (SRBA and ISER 1993). The eventual depletion of whales and other marine mammals, as well as the increased hunting pressure caused by the need for commercial whaling crews' provisions, probably caused critical resource shortages. The promise of jobs and access to trade goods, in addition to famine and disease, caused a decline in the overall population of the region and the relocation of inland peoples to the coastal villages. In response to the famine, and a need to feed stranded commercial whalers, the federal government instituted reindeer herding programs in Point Hope, Wainwright, and Barrow, which lasted until the 1930s. The Barrow reindeer herd dispersed by 1952 because of inattention, predation by wolves, and assimilation into wild caribou herds.

By 1910, commercial whaling had ended and fur trapping became an alternative cash economy method for the Iñupiat. While commercial whaling had brought Iñupiat from the interior to the coast, specifically to Barrow and Wainwright, fur trapping encouraged the Iñupiat to disperse along the coast and return inland to winter trapping camps. The Depression forced fur prices down and made trapping unprofitable for Iñupiat hunters. Thus, following the Depression, the Iñupiat population again aggregated into centralized communities, and schools, missions, churches, and truancy laws were established. Economic growth in Fairbanks and Anchorage presented opportunities for the Iñupiat to move into the growing cities (Hoffman et al. 1988).

During World War II, the U.S. Navy and other federal agencies began exploring the then Naval Petroleum Reserve – Alaska, mapping the Beaufort Sea coast and establishing research stations near Barrow (Ebbley and Joesting 1943). After the war, DEW-Line sites provided employment to Iñupiat people and allowed them continued use of subsistence resources and access to Euro-American goods and services (Hoffman et al. 1988). Wage employment (e.g., National Petroleum Reserve – Alaska, Naval Arctic Research Laboratory, DEW-Line sites, the FAA, and the Weather Bureau) attracted inland and coastal Iñupiat to Barrow (HRAF 1992).

Not all Iñupiat, however, moved to centralized communities. Many continued to move around the land, much as their ancestors had. Iñupiat who settled in Barrow for access to education and health care, returned seasonally to the areas from which their families had come. Following the passage of ANCSA, groups that centralized in Barrow and other coastal villages to gain access to education, health care, employment, and other advantages of a more urban life, began to return to formerly used subsistence harvest areas near Nuiqsut, Anaktuvuk Pass, and Atqasuk (Brown 1979).

## J.6 Cultural Values of Subsistence

For centuries, survival in the Arctic centered on the pursuit of subsistence foods and materials and the knowledge needed to find, harvest, process, distribute, and store the harvest. The development of Iñupiat culture depended on the passing on of traditional knowledge and beliefs about subsistence resources, including observations of game behavior, how to successfully locate and harvest game, and behavior that would ensure successful harvests in the future. Additionally, a suite of tools, techniques, and strategies necessary to survive and thrive in the harsh Arctic environment were handed down (Spencer 1976). Today, subsistence and culture continue to be intertwined for the Iñupiat; the process of obtaining, refining, and passing on subsistence skills is inextricably linked to the Iñupiat culture, which is based on interdependent family groups and a tradition of sharing harvested resources.

# J.7 Contemporary Subsistence Uses

Contemporary subsistence uses reflect centuries-old seasonal resource harvest patterns, based on resource availability and abundance. As Iñupiat residence patterns changed, hunters continued to pursue resources in the same manner and locations as their ancestors (Brown 1979, IAI 1990, SRBA and ISER 1993). The Iñupiat adopted aspects of Euro-American culture and technology, while maintaining core elements of Iñupiat culture, values, and identity (IAI 1990). The Iñupiat have creatively adopted new technologies to continue traditional subsistence pursuits and maintain connections to the land (Spencer 1976).

# J.8 Barrow

The Iñupiat name for the modern Barrow area is *Utqiagviq*, meaning "the place where we hunt snowy owls." As with other communities adjacent to the Planning Area, Barrow residents (population 4,434 in 2002) enjoy a diverse subsistence resource base that includes both marine and terrestrial animals (ADCED 2003). Barrow is situated on a point of land, the demarcation point between the Chukchi and Beaufort seas, where the sea ice is prone to cracking. The main subsistence focus has been marine mammal hunting, and whaling in particular. In Barrow, one of 10 Alaska Eskimo bowhead whaling communities, bowhead whale hunting is the key activity in the organization of social relations in the community and one of the greatest concentrations of effort, time, money, group symbolism, and significance (SRBA and ISER 1993). Other harvested resources, such as caribou, waterfowl and several varieties of fish, are vital for subsistence; however, they have less influence on the organization of social relations than whales. The reliance on subsistence activities remains a key component of the Barrow economy and the local Iñupiat culture. Barrow's location offers superb opportunities for hunting marine and terrestrial mammals, waterfowl, and fish. Barrow harvesters' lifetime subsistence-harvest area, as documented in Pederson (1979), as well as specific subsistence harvest areas and sites for major subsistence resources, are shown in Maps J-2, J-3, and J-4.

## J.8.1 Contemporary Seasonal Round

Barrow's seasonal round is related to the timing of subsistence resources (Figure J-1). Preparation for bowhead whaling occurs year-round. Bowhead whale hunting in the spring is undertaken by Barrow whalers during April and May, with May generally being the most successful month (SRBA and ISER 1993). Traditionally, whaling crew members opportunistically hunted other marine mammals, such as seals and polar bears, after the spring whaling. Beginning with the whaling season of 1978, bowhead whale quotas, instituted by the International Whaling Commission, altered traditional spring whaling activities by reducing opportunities for bowhead whale harvest. Barrow hunters harvest caribou in April, but usually refrain from taking caribou during May because of calving and the spring thaw.

Once the spring whaling season is over, usually in late May or early June, subsistence activities diversify. Some hunters turn their attention to hunting seals, walrus, and polar bears, while others go inland to fish or hunt for waterfowl and caribou. In June, Iñupiat hunters continue to hunt geese and opportunistically harvest caribou, ptarmigan, and eiders. Barrow residents harvest the largest number of caribou in July and August, when the caribou can be hunted by boat (in warmer weather, the caribou move to the coast to escape the heat and insects). In addition, Barrow hunters prefer to harvest caribou in August, when the caribou are in peak condition (Fuller and George 1999). In August, Barrow hunters also harvest marine mammals, eiders, and fish, depending on weather and ice conditions. Bearded seals are harvested principally for their blubber, which is rendered into oil, and their skins, which are used for boat coverings. Ringed seals are harvested primarily for their meat. Walrus are harvested in July and August when they drift north with the floe ice, and if the pack ice moves close enough to Barrow. Freshwater fishing occurs from breakup, in June, through November. Barrow residents fish for Arctic cod year-round, but fish for broad whitefish, the most heavily harvested species, from June to October. Fish harvested in August include whitefish, grayling, salmon and capelin. Residents of Barrow harvest eiders during the "fall migration" in July. Families may go up the Colville River to harvest moose and berries in August and early September.

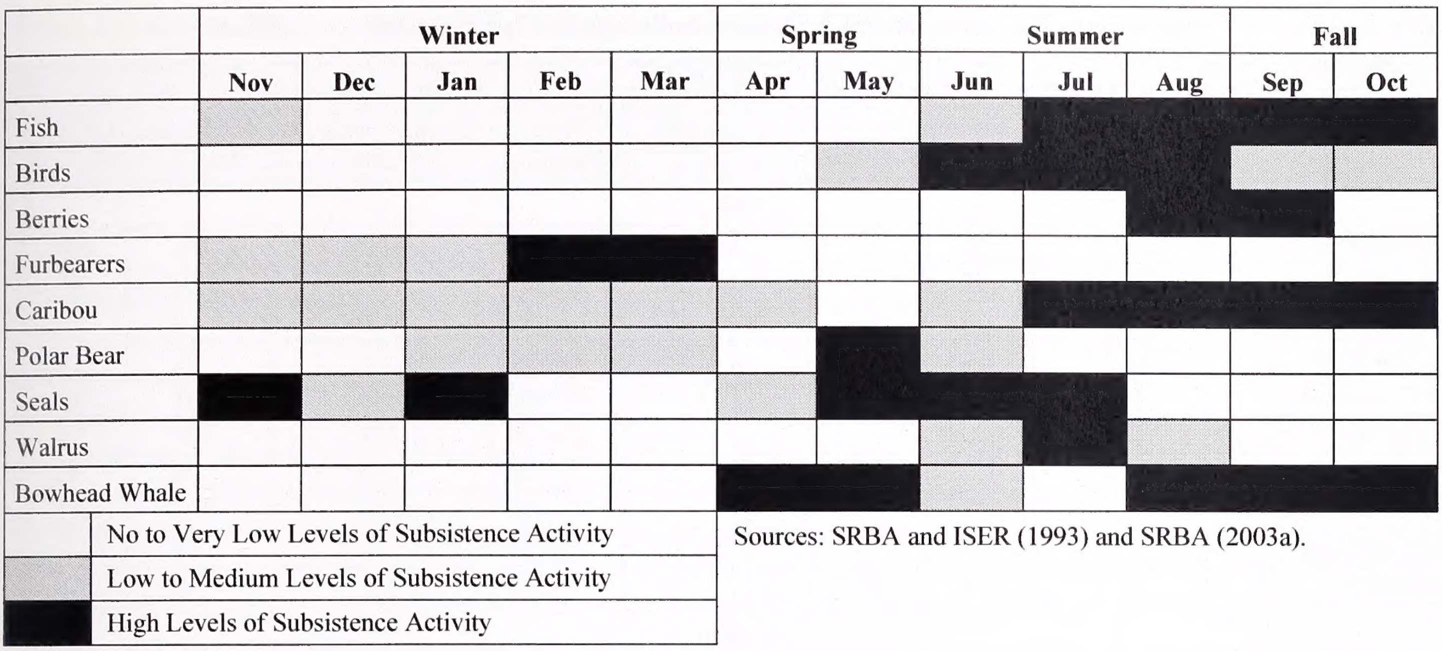



**Figure J-1. Annual Cycle of Subsistence Activities – Barrow.**

If ice conditions are favorable, bowhead whaling in the fall may begin as early as mid-August and continue into October. Residents of Barrow, who have remained inland, hunt caribou if the animals are accessible; otherwise, they concentrate on fishing for grayling and burbot. The subsistence fish harvest generally peaks in October (under-ice fishery), when whitefish and grayling are concentrated at overwintering areas (Fuller and George 1999). During November and December, Barrow residents also harvest ground (or parka) squirrels and ptarmigan, and, if weather and ice conditions permit and the animals appear close to town, seals and caribou (SRBA and ISER 1993). During the winter months, residents of Barrow harvest furbearers, such as wolf and wolverine.

### J.8.2 Subsistence Harvest Estimates

Barrow's total annual subsistence harvests varied from 621,067 pounds in 1987 to 1,363,736 pounds in 1992 (Table J-1; SRBA and ISER 1993). The 1992 harvest of 349 pounds per capita of wild resources represents nearly 1 pound per day per person. Barrow residents rely heavily on large land and marine mammals and fish (Table J-2). Marine mammals comprised approximately 55 percent of the total resources harvested, and land mammals comprised 30 percent of the total.

Bowhead whale, caribou, walrus, and whitefish accounted for approximately 85 percent of Barrow's annual subsistence harvest in terms of edible pounds in 1989 (Table J-2). In 1992, the total harvest of marine mammals (bowhead whale, walrus, and ringed and bearded seals) accounted for approximately 72 percent of the total village harvest of all species, and bowhead whale provided the single greatest contribution of food to the community, at 54 percent of the total harvest (Fuller and George 1999). The success of bowhead whaling in 1992 resulted in a decrease in the harvest of other resources, such as fish. Land mammals (caribou, moose, and Dall sheep) contributed approximately 19 percent of Barrow's total harvest in 1992, and caribou was the principal terrestrial resource (17 percent of the total harvest). Close to half (45 percent) of Barrow households participated in caribou hunting in 1992; caribou is one of the most consistently eaten subsistence resources in Barrow. In 1992, fish constituted approximately 7 percent of the total harvest in Barrow, and broad whitefish was the most important fish resource (4 percent of the total harvest). Birds, such as eiders and geese, contributed less than 2 percent of the total harvest by weight; however, participation in bird hunting was high.

**Table J-1. Barrow Subsistence Harvests and Subsistence Activities 1987, 1988, 1989, and 1992.**

| Resource | Percentage of Households | | | | | Estimated Harvest | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Use | Try to Harvest | Harvest | Receive | Give | Number | Total Pounds | Mean Household Pounds | Per Capita Pounds | % Total Harvest |
| **1987** | | | | | | | | | | |
| All resources | | | 58 | | | | 621,067 | 663 | 206 | 100 |
| Fish | | | 33 | | | 45,563 | 68,452 | 73 | 23 | 11 |
| Salmon | | | 3 | | | 196 | 1,190 | 1 | 0 | <1 |
| Non-salmon | | | | | | 45,367 | 67,262 | 72 | 22 | 11 |
| Land mammals | | | 30 | | | 1,893 | 213,835 | 228 | 71 | 34 |
| Large land mammals | | | | | | 1,660 | 213,777 | 228 | 71 | 34 |
| Small land mammals | | | | | | 233 | 58 | 0 | 0 | <1 |
| Marine mammals | | | 41 | | | | 316,229 | 337 | 105 | 51 |
| Birds and eggs | | | 36 | | | 10,579 | 22,335 | 24 | 7 | 4 |
| Vegetation | | | 3 | | | | 216 | 0 | 0 | <1 |
| **1988** | | | | | | | | | | |
| All resources | | | 50 | | | | 614,669 | 656 | 204 | 100 |
| Fish | | | 18 | | | 38,085 | 51,062 | 54 | 17 | 8 |
| Salmon | | | 1 | | | 80 | 490 | 1 | 0 | <1 |
| Non-salmon | | | 14 | | | 38,005 | 50,571 | 54 | 17 | 8 |
| Land mammals | | | 27 | | | 1,751 | 207,005 | 221 | 69 | 34 |
| Large land mammals | | | 27 | | | 1,599 | 207,005 | 221 | 69 | 34 |
| Small land mammals | | | | | | 152 | 0 | 0 | 0 | <1 |
| Marine mammals | | | 39 | | | 654 | 334,069 | 357 | 111 | 54 |
| Birds and eggs | | | 34 | | | 9,183 | 22,364 | 24 | 7 | 4 |
| Vegetation | | | 2 | | | | 169 | 0 | 0 | 0 |
| **1989** | | | | | | | | | | |
| All resources | | | 61 | | | | 872,092 | 931 | 289 | 100 |
| Fish | | | 29 | | | 68,287 | 118,471 | 126 | 39 | 14 |
| Salmon | | | 10 | | | 2,088 | 12,244 | 13 | 4 | 1 |
| Non-salmon | | | 13 | | | 66,199 | 106,226 | 113 | 35 | 12 |
| Land mammals | | | 43 | | | 1,774 | 214,683 | 229 | 71 | 25 |
| Large land mammals | | | 39 | | | 1,705 | 214,676 | 229 | 71 | 25 |
| Small land mammals | | | 2 | | | 68 | 7 | 0 | 0 | <1 |
| Marine mammals | | | 45 | | | | 508,181 | 542 | 169 | 58 |
| Birds and eggs | | | 41 | | | 12,869 | 29,446 | 31 | 10 | 3 |
| Vegetation | | | | | | | 1,312 | 1 | 0 | <1 |
| **1992** | | | | | | | | | | |
| All resources | | | | | | | 1,363,736 | 1,190 | 349 | 100 |
| Fish | | | | | | | 96,003 | 84 | 25 | 7 |
| Land mammals | | | | | | | 252,661 | 220 | 65 | 19 |
| Marine mammals | | | | | | | 989348 | 863 | 253 | 73 |
| Birds and eggs | | | | | | | 23,866 | 21 | 6 | 2 |
| Invertebrates | | | | | | | 694 | 1 | 0 | <1 |
| Vegetation | | | | | | | 1,164 | 1 | 0 | <1 |

Sources: SRBA and ISER (1993; for 1987-1989), Fuller and George (1999; for 1992), and SRBA (2003a).

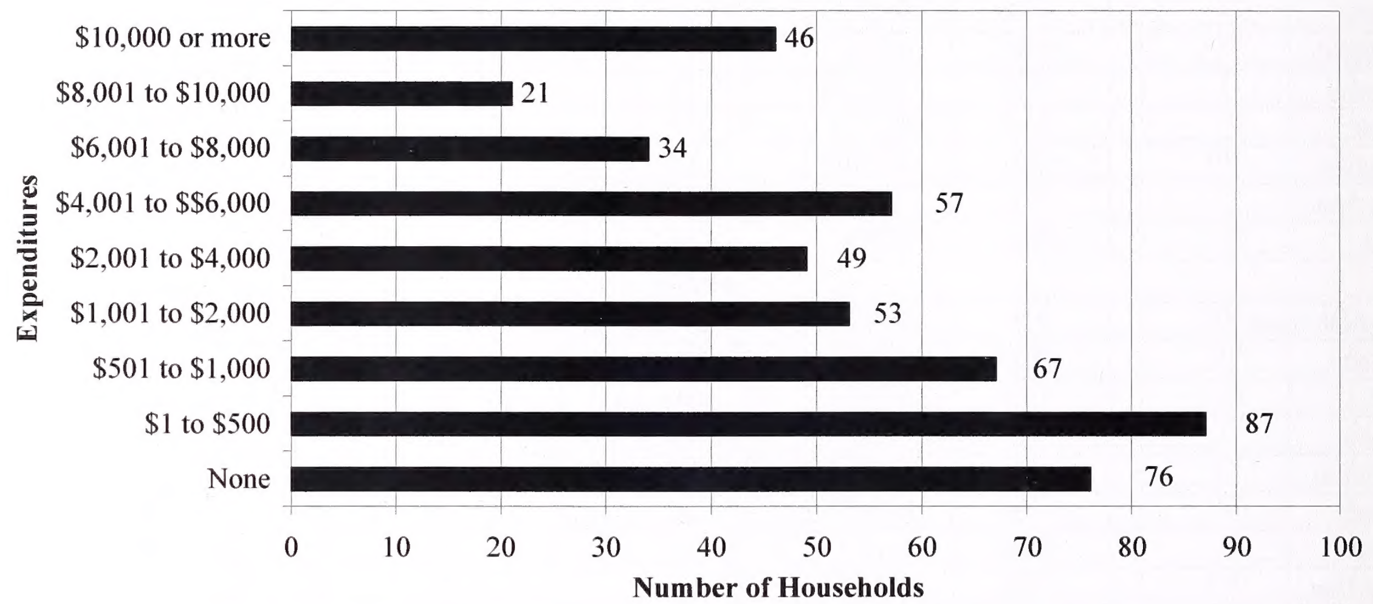
**Table J-2. Selected Barrow Subsistence Harvests for 1987, 1988, 1989, and 1992.**

| Resource | Estimated Harvest | | | | |
|---|---|---|---|---|---|
| | Number | Total Pounds | Mean Household Pounds | Per Capita Pounds | % of Total Harvest |
| **1987** | | | | | |
| Caribou | 1,595 | 186,669 | 199 | 62 | 30 |
| Bowhead whale | 7 | 184,629 | 197 | 61 | 30 |
| Seal | 704 | 61,194 | 65 | 20 | 10 |
| Walrus | 84 | 64,663 | 69 | 21 | 10 |
| Whitefish | 27,367 | 51,253 | 55 | 17 | 8 |
| Moose | 52 | 25,786 | 28 | 9 | 4 |
| Geese | 2,873 | 12,740 | 14 | 4 | 2 |
| Grayling | 12,664 | 10,131 | 11 | 3 | 2 |
| Polar bear | 12 | 5,744 | 6 | 2 | 1 |
| Duck | 5,252 | 7,878 | 8 | 3 | 1 |
| **1988** | | | | | |
| Bowhead whale | 11 | 233,313 | 249 | 77 | 38 |
| Caribou | 1,533 | 179,314 | 191 | 59 | 29 |
| Seal | 570 | 47,890 | 51 | 16 | 8 |
| Walrus | 61 | 47,215 | 50 | 16 | 8 |
| Whitefish | 20,630 | 39,766 | 42 | 13 | 6 |
| Moose | 53 | 26,367 | 28 | 9 | 4 |
| Geese | 3,334 | 14,672 | 16 | 5 | 2 |
| Polar bear | 11 | 5,650 | 6 | 2 | 1 |
| Duck | 4,498 | 6,747 | 7 | 2 | 1 |
| Grayling | 8,684 | 6,947 | 7 | 2 | 1 |
| **1989** | | | | | |
| Bowhead whale | 10 | 377,647 | 403 | 125 | 43 |
| Caribou | 1,656 | 193,744 | 207 | 64 | 22 |
| Whitefish | 38,054 | 92,399 | 99 | 31 | 11 |
| Walrus | 101 | 77,987 | 83 | 26 | 9 |
| Seal | 440 | 33,077 | 35 | 11 | 4 |
| Geese | 3,944 | 16,289 | 17 | 5 | 2 |
| Moose | 40 | 20,014 | 21 | 7 | 2 |
| Polar bear | 39 | 19,471 | 21 | 6 | 2 |
| Duck | 8,589 | 12,883 | 14 | 4 | 1 |
| Grayling | 8,393 | 6,714 | 7 | 2 | 1 |
| **1992** | | | | | |
| Bowhead whale | 22 | 729,952 | 637 | 187 | 54 |
| Caribou | 1,993 | 233,206 | 203 | 60 | 17 |
| Walrus | 206 | 159,236 | 139 | 41 | 12 |
| Bearded Seal | 463 | 81,471 | 71 | 21 | 6 |
| Broad whitefish | 23,997 | 59,993 | 52 | 15 | 4 |

Sources: SRBA and ISER (1993; for 1987-1989), Fuller and George (1999; for 1992), and SRBA (2003a).

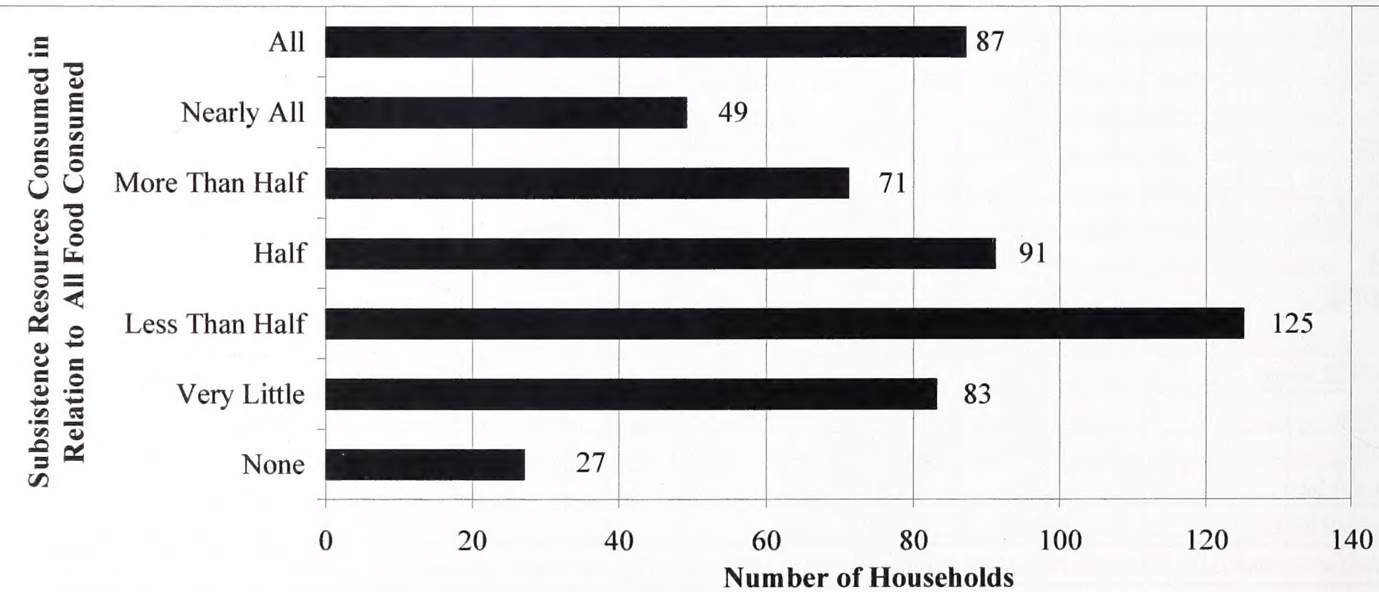
Household consumption and expenditures used for pursuit of subsistence resources are shown in Figures J-2 and J-3. Household expenditures for subsistence activities shown in Figure J-2 indicate that 414 households (84 percent of all households that responded to the 1998-1999 NSB survey) spent from $1 to $10,000 on subsistence activities during the previous calendar year. Seventy-six households (16 percent) reported spending no money on subsistence

activities, 87 households (18 percent) spent from $1 to $500 on subsistence activities, and 159 households (32 percent) spent between $1,001 and $6,000 per year on subsistence activities. Twenty-one percent of responding households reported spending more than $6,000 in the previous year on subsistence activities. Out of the households that responded to the subsistence foods consumption survey, 298 (56 percent) reported eating subsistence foods for half or more of their food intake, while 83 respondents (16 percent) reported eating very little, and only 27 (5 percent) reported eating no subsistence foods at all (Figure J-3). It is likely that some number of those not spending money on subsistence pursuits are receiving subsistence foods from other households, or are participating indirectly as part of family or group activities (NSB 1999).




Note: Results include only those households participating in the census survey and answering the question: "...what is your best estimate of the money you spent on subsistence activities (during the past calendar year)?"

**Figure J-2. Barrow Expenditures on Subsistence Activities, 1998-1999.**




Note: Results include only those households participating in the census survey and answering the question: "How much of the meat, fish, and birds you and your household ate come from local food sources (fishing and hunting)?"

**Figure J-3. Barrow Household Consumption of Subsistence Foods, 1998-1999.**

### J.8.3 Contemporary Subsistence Use Areas

The community of Barrow incorporates residents from throughout the NSB. Many residents hunt in the areas where they were raised, which may include the subsistence harvest areas of other communities. Former residents and family members who now reside in Anchorage or Fairbanks may receive subsistence foods from Barrow. Pedersen (1979) documented Barrow lifetime subsistence use areas in the 1970s (Map J-2) and SRBA and ISER (1993) conducted a 3-year subsistence harvest study in Barrow for the 1987 to 1989 harvest years (Map J-3). With a few exceptions, primarily associated with offshore and furbearer use, the harvest locations for the 1987 to 1989 study period were located within Pedersen's (1979) Barrow lifetime community land use area. The documented Barrow subsistence use area represents a large geographic area, extending beyond Wainwright in the west, to the Kuparuk River in the east, and south to the Avuna River. Inland use areas go beyond the Colville River to the foothills of the Brooks Range. The Barrow subsistence harvest data from both the 1970s and 1980s (Maps J-2 and J-3), and from 1990 to 2003 (Map J-4), show Barrow residents using the Colville River Delta area for subsistence activities.

### J.8.4 Contemporary Subsistence Use Areas East of the Community

In August 2003, SRBA interviewed eight subsistence harvesters in Barrow for the *Alpine Satellite Development Plan EIS*. One purpose of these interviews was to learn whether, and to what extent, Barrow subsistence harvesters use the Kogru and Kalikpik rivers, Fish and Judy creeks, and the Colville River Delta areas for subsistence activities. These interviews focused only on these three locations, and did not represent a comprehensive discussion of Barrow subsistence use areas. These interviews were coordinated with the Iñupiat Community of the Arctic Slope who identified Barrow subsistence users for these interviews.

The Iñupiat Community of the Arctic Slope chose subsistence hunters who either traveled far to the east of Barrow, or who had been raised east of Barrow and returned to their "homeland" for subsistence activities. As shown in Map J-4, the area currently used by the eight interviewed hunters generally coincided with the Barrow lifetime community land use area east and southeast of Barrow, with the following exceptions: the interviewed hunters generally did not utilize the formerly used area east of the Itkillik River; they traveled farther south in the vicinity of the Anaktuvuk River; and they made expanded use of the area near the Titaluk and Kigalik rivers approximately 120 miles south of Barrow.

Generally, the interviewed Barrow hunters used the area east of Cape Halkett to pursue wolf, wolverine, and caribou. In winter, the hunting area for these three animals overlapped, as hunters looking for wolf and wolverine tended to cover great distances, and also harvested caribou on their travels. In summer, the caribou use area extended down the coast from Smith Bay to Cape Halkett, across the coastal areas of Harrison Bay to the Colville River Delta, and up the Colville River as far as Ocean Point. Several Barrow families have relatives living in Nuiqsut who move back and forth between the two communities. Many Barrow residents with ancestral ties to areas between Barrow and Nuiqsut continue to return to these traditionally used areas for subsistence activities. Barrow hunters use the Northeast National Petroleum Reserve – Alaska area primarily for caribou, moose, and furbearers (wolf and wolverine). One Barrow interviewee indicated he had hunted moose in the Colville River from south of Umiat to approximately Ocean Point. The interviewed Barrow hunters indicated that they fished as far east as the lakes in the vicinity of Cape Halkett.

Several families now living in Barrow have elders who were born and raised along the coast between Smith Bay and the Colville River Delta. These families moved to Barrow, most often in the late 1940s, primarily because children were required to attend school; some families moved for jobs or access to medical care. Once the families resided in Barrow, they made special efforts to return to the coast from Smith Bay to the Cape Halkett area, to continue subsistence activities at traditional family harvest areas (see Maps J-3 and J-4). The third generation of these families continues to use the traditional areas, often harvesting resources that are less available in the Barrow

area, such as furbearers (wolf, wolverine, fox and Arctic ground squirrels), caribou, and moose. Seals and fish are harvested closer to Barrow. A Barrow hunter described a recent summer caribou hunt as follows:

> When the Western Arctic Herd are further west from Barrow in Point Lay or Point Hope, that's too far to travel. We had to go east through the ocean to the Cape Halkett area and go into creeks looking for caribou. On nice warm days, you find caribou on the coast and in the water, in the end of July or the first part of August. We go for 1 week. My uncle has a cabin near Cape Halkett (SRBA 2003b).

Furbearer hunts, unlike subsistence food resource hunts, involve friendly competition. Furs are not shared in the same way as food resources, and the hunts take place over much larger areas. One hunter stated, in good humor, "We fish closest to our own area, we do not try to step on each others toes with fish, but we have no respect [for territory] when it comes to wolf and wolverines!" Barrow residents from the same families, known for their connection with the Cape Halkett area, use a vast area to the south and east of Teshekpuk Lake for furbearer hunting, and travel into the Fish and Judy creeks, Ublutuoch River, Itkillik River, and Umiat areas while hunting wolves and wolverines (Map J-4). One hunter said, "I like to go to the south side of Teshekpuk Lake, Inigok, and Umiat before the snow is too soft to get wolves and wolverines for clothing" (SRBA 2003b). Another hunter, explaining his winter hunting by snowmachine, stated:

> From February through March, I travel to the east for furbearers. I go down to Price River, then to Fish and Judy creeks, then through Inigok to the Ikpikpuk, back over to the Colville to Umiat, down through the Itkillik, back and forth in a circle, then up to Teshekpuk Lake. I go on both sides of the river. By April the fur isn't so great, so I go home.

According to 2003 interview data, Barrow hunters occasionally use the Kalikpik-Kogru rivers area for caribou during the summer, especially if caribou are not available closer to Barrow. The hunters reported that they traveled by boat as far as the Kogru River, and that other Barrow hunters likely traveled further east. Several Barrow families historically and currently use this area. During the winter, the Colville River Delta is on the eastern edge of Barrow's use area. Barrow residents make use of the Fish and Judy creeks area for caribou, wolf, wolverine, and fox by snowmachine. Hunters use cabins and camps near Teshekpuk Lake (e.g., Puviaq and Inigok) and along the Ikpikpuk and Chipp rivers as bases for snowmachine travel.

In addition to the harvest of resources, use of these areas is important to Barrow residents for maintaining connection to family history, graves, structures, caches, ice cellars, campsites, and traditional harvest areas. Although there are high costs associated with fuel, time, equipment, and effort for these trips, the cultural connection to these traditional areas is strong.

#### J.8.4.1 Bowhead Whale

Barrow residents hunt bowhead whales during the spring and fall; however, more whales are harvested during the major whaling season in the spring (Figure J-1). In 1977, the International Whaling Commission established an overall quota for subsistence hunting of the bowhead whale by the Alaskan Eskimos. The quota is currently regulated by the Alaska Eskimo Whaling Commission, which annually decides how many bowhead whales each whaling community may take. A vote at the May 2002 meeting of the International Whaling Commission denied the Alaskan Iñupiat a bowhead whale quota. North Slope whalers pursued diplomatic measures through the State Department to conduct another vote on the bowhead whale quota, and were successful in getting the quota restored (Dobbyn 2002, Gay 2002, Kizzia 2002, Kizzia and O'Harra 2002). Presently, Barrow whalers continue to hunt in the fall to meet their quota and to seek strikes that can be transferred to the community from other villages. Barrow crews may be joined by members from other communities for spring whaling. Some captains from other communities may have different ranks for spring whaling in Barrow than for fall whaling in their home villages (SRBA 2003b).

From early April through the first week of June, the Iñupiat hunt bowhead whales from leads that open as pack-ice conditions deteriorate. Barrow whalers hunt bowhead whales from camps located along the coast from Point Barrow to the Skull Cliff area. There are approximately 30 spring whaling camps along the edge of the landfast ice. While the locations of these camps depend on ice conditions and currents, most whaling camps are located south of Barrow. The distance of the leads from shore varies from year to year. The leads are generally parallel to and quite close to the shore, but occasionally break directly from Point Barrow to Point Franklin, forcing Barrow whalers to travel over the ice as far as 10 miles offshore. Typically, the lead is open from Point Barrow to the coast, and hunters whale only 1 to 3 miles from shore. A stricken whale can be chased in either direction in the lead. Spring whaling in Barrow is conducted almost entirely with skin boats, which are easier to maneuver than aluminum skiffs, and do not transmit sounds that could alert nearby whales (ACI et al. 1984; SRBA and ISER 1993).

In the fall, whaling occurs east of Point Barrow, from the Barrow vicinity to Cape Simpson. During the fall migration, Iñupiat whalers use aluminum skiffs with outboard motors to pursue the whales in open water, up to 30 miles offshore.

No other marine mammal is harvested with an effort as concentrated and intense as that of the bowhead whale harvest. Bowhead whales are very important in the subsistence economy, and accounted for over 21 percent (an average of 10 whales per year) of the annual Barrow subsistence harvest from 1962 to 1982 (Stoker 1983). During the final year of a study in 1989, data indicated that approximately 58 percent of the total harvest was marine mammals and close to 43 percent of the total harvest was bowhead whales (Tables J-1 and J-2; SRBA and ISER 1993, ADFG 2001). As with all species, the number of bowhead whales harvested varies from year to year. Over the past 30 years, the number of whales taken each year varied from 0 to 23. Barrow's current community residents stated that 1982 was the only year in which no bowhead whales were harvested (ACI et al. 1984; SRBA and ISER 1993).

#### J.8.4.2 Beluga Whale

Beluga whales are available from the beginning of the spring whaling season through June, and occasionally into July and August, in ice-free waters. Barrow hunters do not like to hunt beluga whales during the bowhead whale hunt for fear of scaring away the larger animals. Thus, the hunters harvest beluga whales after the spring bowhead whale season ends, which is dependent on when the bowhead whale quota is reached. Beluga whales are harvested in the leads between Point Barrow and Skull Cliff, and later in the summer beluga whales are occasionally harvested on both sides of the barrier islands of Elson Lagoon. The annual average number of beluga whale harvested in Barrow, between 1962 and 1982, was estimated to be five whales, or less than 1 percent of the total annual subsistence harvest (Stoker 1983). In SRBA and ISER's study, there were no harvests of beluga whales in the 3-year period of data collection; however, non-sampled households might have harvested some beluga whales (SRBA and ISER 1993, ADFG 2001). The annual subsistence harvest for the eastern Chukchi Sea was reported to be approximately 60 beluga whales per year by the NOAA Fisheries Service (Angliss and Lodge 2002). Since 1987, the Alaska Beluga Whale Committee recorded 23 beluga whales taken by Barrow hunters, ranging from 0 in 1987, 1988, 1990, and 1995, to 2 in 1992, to a high of 8 in 1997 (Fuller and George 1999, Alaska Beluga Whale Committee 2002).

#### J.8.4.3 Caribou

Caribou, the primary terrestrial source of meat for Barrow residents, are available throughout the year, with peak harvest periods from February through early April and from late June through late October (Figure J-1). The approximate boundary for Barrow's primary subsistence harvest area for caribou, as reflected in research conducted in the late 1980s and early 1990s, extends southwest from Barrow along the Chukchi coast for roughly 35 miles, then runs south and eastward toward the drainage of the upper Meade River. It heads easterly, crossing the Usuktok River, and then trends north and east, crossing the Topaguruk and Oumalik rivers, until it reaches Teshekpuk Lake; from here the boundary generally follows the coastline back to Barrow (Map J-3). Over the 20-year period from 1962 to 1982, residents harvested an annual average of 3,500 caribou, which accounted for 58

percent of the total annual subsistence harvest (Stoker 1983). From 1987 through 1989, caribou provided 22 to 30 percent of the total edible pounds harvested by Barrow residents (Table J-2; SRBA and ISER 1993, ADFG 2001).

#### J.8.4.4 Seals

Hair seals are available from October through June; however, because of the high availability of bowhead whales, bearded seals, and caribou during other parts of the year, hair seals are harvested primarily during the winter months (Figure J-1). Ringed seals are the most common hair seal species harvested. Ringed seal hunting is concentrated in the Chukchi Sea, although some hunting occurs off Point Barrow, and along the barrier islands that form Elson Lagoon. During the winter, leads in the area immediately adjacent to Barrow and north toward Point Barrow point make this area an advantageous spot for sealing. Spotted seals are occasionally harvested off Point Barrow and the barrier islands of Elson Lagoon. Oarlock Island in Admiralty Bay is a favorite place for hunting spotted seals. From 1962 to 1982, hair seal harvests were estimated at between 31 and 2,100 seals a year. The average annual harvest from 1962 to 1982 was estimated at 955 seals, or 4 percent of the total annual subsistence harvest (Stoker 1983). During 1987 through 1989, ringed seals provided approximately 2 percent of the total edible pounds harvested (SRBA and ISER 1993, ADFG 2001).

The hunting of bearded seals is an important subsistence activity in Barrow. Bearded seal meat is a preferred food, and the skins are used to cover skin boats used for whaling. Six to nine bearded seals' skins are needed to cover a boat. Bearded seals are harvested more often than the smaller hair seals, because of their large body size and thick hides. They are hunted in both the Chukchi and Beaufort seas during the summer months, and from open water while hunters are pursuing other marine mammals (NSB 1998). Occasionally, bearded seals are available in Dease Inlet and Admiralty Bay. The average annual subsistence harvest of bearded seals from 1962 to 1982 was 150 seals, or approximately 3 percent of the total annual subsistence harvest (Stoker 1983). The reported average annual harvest of 174 bearded seals during the 1987 to 1989 period provided slightly more than 4 percent of the total edible pounds harvested for those study years (SRBA and ISER 1993).

#### J.8.4.5. Fish

Barrow residents harvest marine and riverine fish, such as capelin, char, cod, grayling, salmon, sculpin, trout, and whitefish (ACI et al. 1984); however, their dependency on fish varies with the availability of other resources. Fishing occurs primarily in the summer and fall months, and peaks in September and October (Figure J-1). Tom cod are harvested during the fall and early winter when there is still daylight (NSB 1998). The subsistence harvest area for fish is extensive, primarily because Barrow residents supplement their camp food with fish whenever they are hunting.

Most fishing by Barrow Iñupiat in the Planning Area occurs at inland fish camps, particularly in lakes and rivers that flow into the southern end of Dease Inlet (Craig 1987). Inland fish camps are found in the Inaru, Meade, Topaguruk, Chipp, Alaktak, and Ikpikpuk river drainages, and as far east as Teshekpuk Lake. Inland fisheries within or adjacent to the Planning Area include those on the Alaktak and Ikpikpuk river drainages and on Teshekpuk Lake. At these established fish camps, hunters set nets for whitefish, char, and salmon. These camps provide good fishing opportunities as well as access to inland caribou and birds. Inland fishing intensifies when whitefish and grayling begin to migrate out of the lakes into the major rivers in August. This is also the peak harvest period for berries and greens (Schneider et al. 1980; ACI et al. 1984). From 1969 to 1973, the average annual harvest of fish was about 80,000 pounds (Craig 1987); from 1962 to 1982, the estimated annual average was 60,000 pounds (Stoker 1983). In a 1986 partial estimate of fish harvests for the Barrow fall fishery in the Inaru River, the catch included least cisco (45 percent), broad whitefish (36 percent), humpback whitefish (16 percent), Arctic cisco (1 percent), fourhorn sculpin (1 percent), and burbot (less than 1 percent; Craig 1987). Fish harvests from 1987 to 1989 were approximately 80,000 pounds annually and provided approximately 11 percent of the total annual edible subsistence harvest (Table J-1; SRBA and ISER 1993).

### J.8.4.6 Walrus

Walrus are harvested during the summer marine mammal hunt west of Point Barrow and southwest to Peard Bay. Most hunters will travel no more than 15 to 20 miles to hunt walrus. The major walrus hunting effort occurs from June through mid-August, with the peak season in July (Figure J-1). The annual average harvest from 1970 through 1979 was estimated at 57 walrus. The annual average harvest from 1962 to 1982 was estimated at 55 walrus, or approximately 5 percent of the total annual subsistence harvest (Stoker 1983). The 1987 to 1989 study indicated a greater walrus harvest than reported earlier; an annual harvest of 81 walrus provided 9 percent of the total edible pounds of meat harvested during this period. From 1989 to 1995, 109 walrus were harvested, ranging from a low of 1 walrus harvested in 1989 to a high of 30 in 1993 (Stephensen et al. 1994; Cramer 1996). Between 1990 and 2002, the harvest ranged from 7 to 206 animals (SRBA and ISER 1993, Fuller and George 1999, Schliebe 2002).

### J.8.4.7 Migratory Birds

Migratory birds, particularly eider ducks and geese, provide an important food source for Barrow residents because of their dietary importance during spring and summer. In May, hunters travel great distances, along major inland rivers and lakes, to harvest geese, while most eider and other ducks are harvested along the coast (Schneider et al. 1980). Previously harvested extensively, snowy owls are no longer taken on a regular basis. Birds' eggs are still gathered occasionally, especially on the offshore islands where foxes and other predators are less common. Waterfowl are hunted during the spring whaling season (beginning in late April or early May) when their flights follow the open leads, providing a source of fresh meat for whaling camps. Later in the spring, Barrow residents harvest many geese and ducks; the harvest peaks in May and early June and continues through the end of June (Figure J-1). In late August and early September, with peak movement in the first two weeks of September, ducks and geese migrate south and are again hunted by Barrow residents. Eiders and other ducks are hunted along the coast, from Point Franklin to Admiralty Bay and Dease Inlet. Concentrated hunting areas are also located along the shores of the major barrier islands of Elson Lagoon. During spring whaling, families not involved with whaling may hunt geese; additionally, successful whaling crews may hunt geese while other crews are still whaling (NSB 1998).

A favorite spot for hunting birds is the "shooting station" at the narrowest point of the barrier spit that forms Point Barrow and separates the Chukchi Sea from Elson Lagoon. This area, a highly successful hunting spot during spring and fall bird migrations, is easily accessible to Barrow residents. Barrow residents harvested an estimated annual average of 8,000 pounds of birds from 1962 to 1982, which accounted for approximately 1 percent of the total annual subsistence harvest (Stoker 1983). From 1987 to 1989, 74,145 pounds of birds were harvested, accounting for approximately 4 percent of the total edible pounds harvested (SRBA and ISER 1993, ADFG 2001).

### J.8.4.8 Polar Bear

Barrow residents hunt polar bears in the winter and spring (Figure J-1); however, polar bears comprise a small portion of the Barrow subsistence harvest, with an annual average of eight bears harvested from 1962 to 1983, or less than 1 percent of the annual subsistence harvest (Schliebe 1983; Stoker 1983). From 1987 to 1989, polar bears provided approximately 2 percent of the total edible pounds harvested (Table J-2; SRBA and ISER 1993, ADFG 2001).

## J.9 Atqasuk

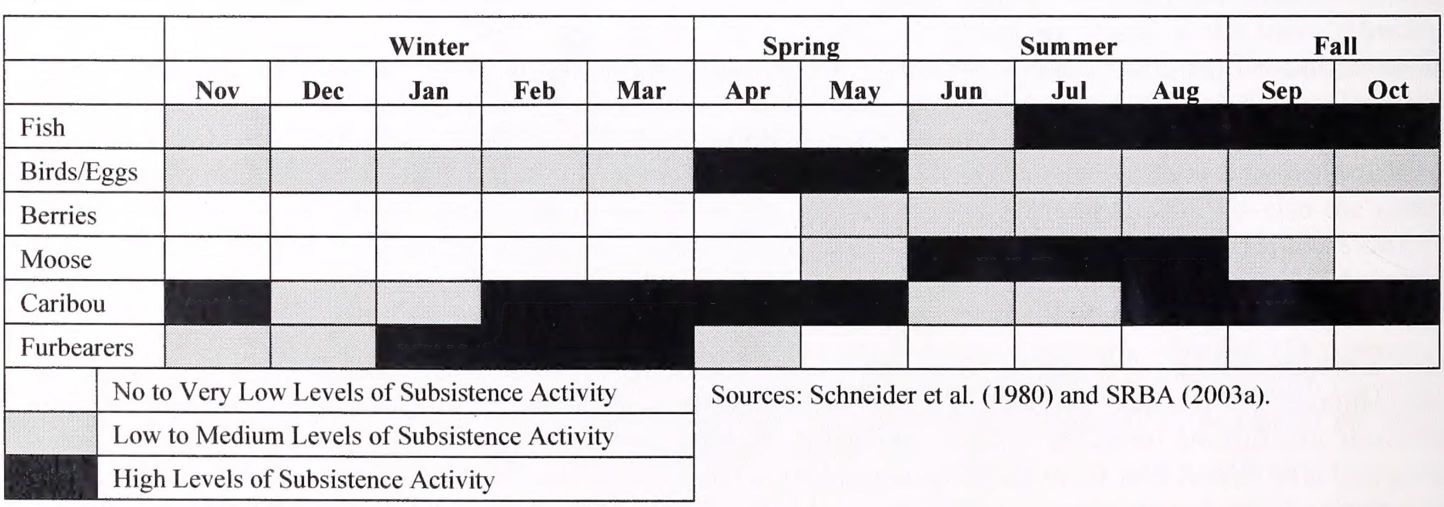
The community of Atqasuk is located on the banks of the Meade River, 60 air miles south of Barrow. Atqasuk had a population of 231 residents in 2002 (ADCED 2003). Located near the site of several former settlements used in prehistoric and historic times, the current community is situated near a coal mine that provided fuel for Barrow during and after World War II, when the community was known as Meade River. The area is rich in caribou, fish, and waterfowl, and hunters access areas of the coast for seals and other marine resources. Some Atqasuk hunters are members of Barrow whaling crews and take part in bowhead whaling and festivities in Barrow, returning with shares after a successful harvest.

Atqasuk residents use the same variety of marine resources as Barrow residents, but only a small portion of the marine resources used by Atqasuk residents are acquired on coastal hunting trips initiated in Atqasuk; most are acquired on hunting trips initiated in Barrow or Wainwright with relatives or friends (ACI et al. 1984; SRBA 2003b). These connections with coastal and marine resources are important to the community. As one resident observed: "We use the ocean all the time, even up here; the fish come from the ocean; the whitefish as well as the salmon migrate up here" (ACI et al. 1984).

Atqasuk depends on the same resources as Barrow, but in different proportions, and their subsistence use areas overlap significantly. Areas heavily used by local subsistence hunters include the entire Meade River drainage, Avalik River, and upper Okpiksak, Topaguruk, and Nigisaktuvik rivers (Schneider et al. 1980; SRBA and ISER 1993). Atqasuk's subsistence-harvest area, as described in 1979, is depicted in Map J-5. Map J-6 shows more recent subsistence use areas for non-marine resources, as described in interviews conducted for the *Alpine Satellite Development Plan EIS* (SRBA 2003b).

## J.9.1 Contemporary Seasonal Round

Atqasuk subsistence harvests rely on a diversity of seasonally abundant resources that hunters must harvest when available (Figure J-4). Some species, like ptarmigan and caribou, may be present year-round, but are only harvested when permitted, or when encountered. December and January generally are not productive months for subsistence resource pursuits because of the winter weather and seasonal darkness. Between November and April, furbearer harvesters travel substantial distances from the community to harvest wolves, foxes, and wolverines; depending on snow conditions, the peak of harvest activity is in February and March. In late February through March, some residents may begin fishing under the ice on the Meade River, its tributaries, and any lakes that do not freeze completely, as an adjunct to fur and caribou hunting (SRBA 2003b). Additionally, hunters may harvest caribou if they are encountered at this time; the need to harvest more caribou may increase through March, as late fall food supplies are depleted. The harvest of caribou increases as the length of daylight increases and the weather becomes more moderate. Some residents may travel to Barrow to participate in spring whaling. Beginning in May, hunters pursue migrating birds and caribou. The breakup of river ice and lack of snow in June make travel difficult. After the ice goes out, gill-netters harvest fish near the Atqasuk community as the fish move upriver to spawn. The high water on the rivers and lakes of the area in late spring and early summer allows the most extensive boat travel. Later in the summer, the water levels may be too low to allow long-range travel, so community residents plan their travels for late June through July. Subsistence resources are particularly abundant from July through September; hunters harvest grizzly bears, moose, squirrels, and migratory birds throughout the summer. By October, migratory birds have left the area, and hunters shift their focus to caribou and fish. In November, hunters attempt to harvest enough caribou for the upcoming winter; the fish have already left most of the lakes for the deep river channels to overwinter.




Sources: Schneider et al. (1980) and SRBA (2003a).

**Figure J-4. Annual Cycle of Subsistence Activities – Atqasuk.**

## J.9.2 Subsistence Harvests

Atqasuk is similar to Nuiqsut and Barrow in that residents harvest caribou, fish, and birds locally; however, Atqasuk is more connected to Barrow than to Nuiqsut for marine mammal harvests and membership in whaling crews (Hepa et al. 1997). Limited subsistence harvest data are available for Atqasuk (Tables J-3 and J-4). Neither the ADFG nor the MMS have collected subsistence harvest data for Atqasuk, and the NSB Department of Wildlife Management has only collected harvest data for the harvest year 1994-1995 (Hepa et al. 1997), and participation data for 1992 (Fuller and George 1999). For 1994-1995, 57 percent of the harvest by edible pounds consisted of caribou, with 37 percent fish, 3 percent birds, 2 percent marine mammals, and 1 percent plants. Atqasuk residents harvested caribou primarily within 10 miles of Atqasuk, with the majority harvested between July and December (Hepa et al. 1997). Residents harvested fish between June and November, with the greatest number of fish harvested between August and October. Subsistence hunters at Atqasuk harvested 279 birds in May, 8 seals in July, and 84 gallons of berries between July and September (Table J-4). Other subsistence foods may be received as shares and traded or bartered within the community and with other villages. Between October and May, fur hunters harvested 2 wolves, 6 ground squirrels and 10 wolverines.

**Table J-3. Atqasuk Subsistence Harvests Participation for 1994-1995.**

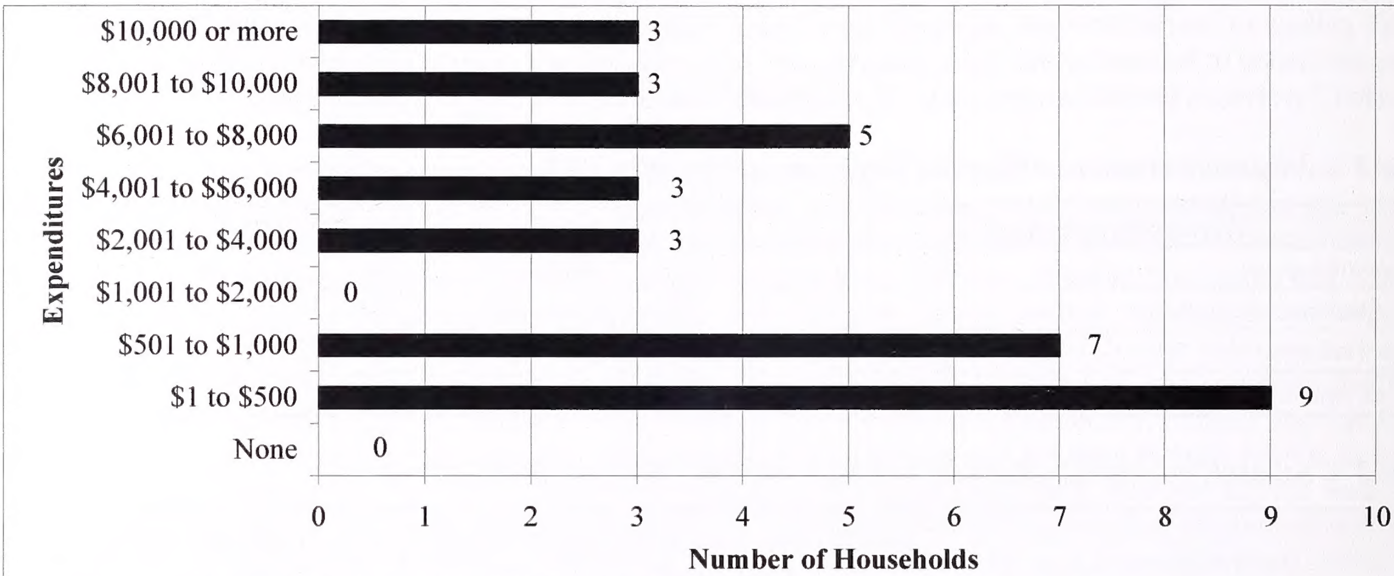
| Harvest Participation (%) | | Harvest Instances Resulting in Sharing (%) | |
|---|---|---|---|
| Successful harvest | 74 | Shared | 91 |
| Attempted, not successful | 3 | Not Shared | 4 |
| Did not attempt | 23 | Unknown | 5 |
| Sources: Hepa et al. (1997) and SRBA (2003a). | | | |

**Table J-4. Atqasuk Subsistence Harvest Totals, Actual and Estimated for 1994-1995.**

| Harvest Items | Total Number Harvested for 40 Households | Estimated Total Number Harvested for 56 Households |
|---|---|---|
| Whitefish | 1,400 | 1,960 |
| Broad whitefish | 1,630 | 2,282 |
| Burbot | 162 | 227 |
| Grayling | 5,716 | 8,002 |
| Humpback whitefish | 500 | 700 |
| Rainbow trout | 15 | 21 |
| Silver salmon | 10 | 14 |
| Salmonberries (gallons) | 72 | 101 |
| Blueberries (gallons) | 12 | 17 |
| White-fronted goose | 76 | 106 |
| Goose (unidentified) | 168 | 235 |
| Canada goose | 2 | 3 |
| Brant | 5 | 7 |
| Eider (unidentified) | 12 | 17 |
| Ptarmigan | 16 | 22 |
| Caribou | 187 | 262 |
| Ground squirrel | 6 | 8 |
| Wolf | 2 | 3 |
| Wolverine | 10 | 14 |
| Ringed seal | 4 | 6 |
| Bearded seal | 4 | 6 |
| Sources: Hepa et al. (1997) and SRBA (2003a). | | |

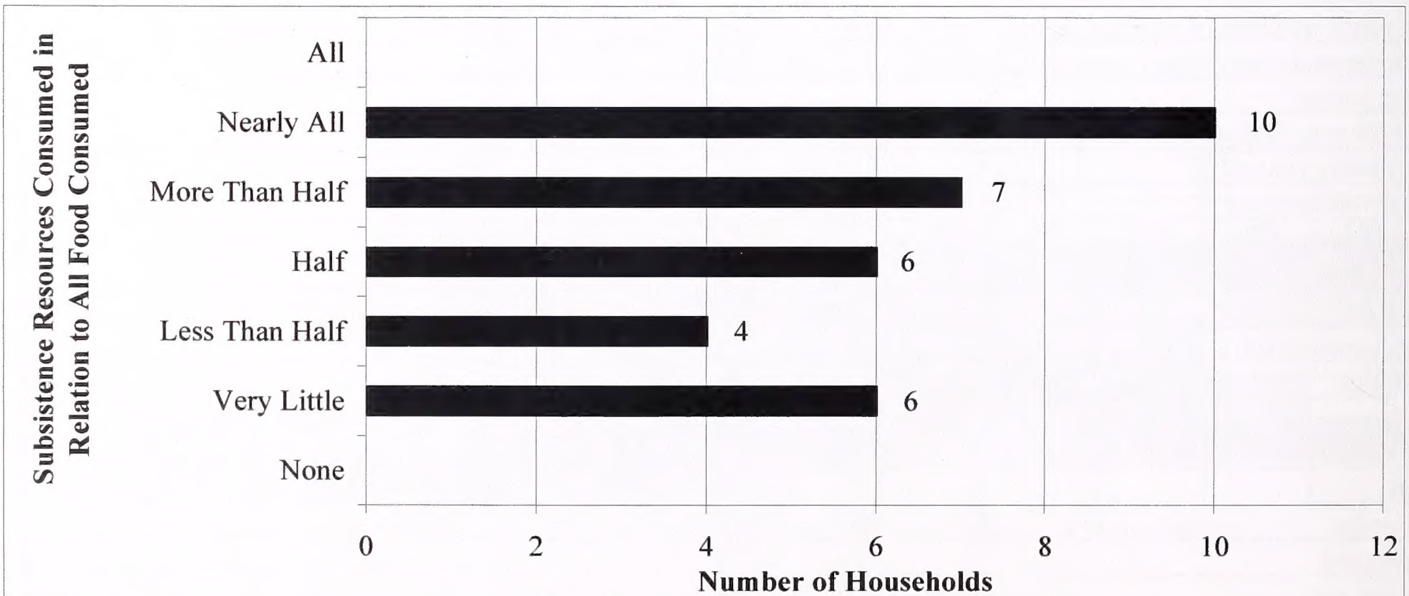
Most Atqasuk residents participated in subsistence activities and shared subsistence resource harvests (Table J-3). Of interviewed households in 1994-1995, 77 percent of residents attempted to and/or were successful in harvesting subsistence resources (Hepa et al. 1997). Fuller and George (1999) reported similar participation rate information for the 1992 harvest year; of households that successfully harvested subsistence resources in 1994-1995, 91 percent shared their resources with others and 4 percent did not.

Households responding to a 1998-1999 NSB census survey reported that 17 households (52 percent) spent more than $2,000 on subsistence activities, 11 households (33 percent) spent between $4,000 and $10,000, and 3 households (9 percent) spent more than $10,000 (Figure J-5). Of households that responded to the survey, 23 households (70 percent) consumed half or more of their food from subsistence harvests, 4 households (12 percent) consumed less than half, and 6 households (18 percent) consumed very little subsistence food (Figure J-6).




Note: Results include only those households participating in the census survey and answering the question:
"...what is your best estimate of the money you spent on subsistence activities (during the past calendar year)?"

**Figure J-5. Atqasuk Expenditures on Subsistence Activities, 1998-1999.**




Note: Results include only those households participating in the census survey and answering the question:
"How much of the meat, fish, and birds you and your household ate come from local food sources (fishing and hunting)?"

**Figure J-6. Atqasuk Household Consumption of Subsistence Foods, 1998-1999.**

### J.9.3 Contemporary Subsistence Use Areas

Subsistence hunters at Atqasuk use harvest locations relatively close to the community, with some use of the coast west of Barrow and of Dease Inlet (Schneider et al. 1980; Hepa et al. 1997). The main advantages of Atqasuk's location are access to river and lake resources and position in the migration path of the TLH caribou (Schneider et al. 1980). Atqasuk's lifetime subsistence use area, as described in the 1970s and depicted in Maps J-5 and J-6, extends from northeast of Wainwright to Barrow, along the coast to the vicinity of Smith Bay, south along the Ikpikpuk River to the Titaluk River, and west and north to Peard Bay (Pedersen 1979).

### J.9.4 Atqasuk Subsistence Use Areas East of the Community

In August 2003, SRBA interviewed seven subsistence harvesters in Atqasuk. One of the purposes of these interviews was to learn if Atqasuk residents currently used the Kogru and Kalikpik rivers, Fish and Judy creeks, or Colville River Delta areas for subsistence activities. The interviews focused on areas east of Atqasuk, and did not address current subsistence uses north, south, or west of Atqasuk.

Based on these interviews, the area used in the last 10 years has expanded from the use area depicted by Pedersen (1979). The use area extends from the eastern edge of Teshekpuk Lake in the east, to the Kaolak River in the west, to the Inaru River in the north, and beyond the Colville River in the south (Map J-6). Several Atqasuk residents have ties to the Smith Bay-Cape Halkett-Kogru River areas, and some of these residents intensively used the area north and southeast of Teshekpuk Lake in their youth. One hunter stated that there were "numerous small camps and villages along the coast between Drew Point, Smith Bay, and Dease Inlet. It was a [caribou] grazing area" (SRBA 2003b). He explained that there were many ice cellars in an area between the mouth of the Ikpikpuk River and Teshekpuk Lake named *Shubjat*, because it was high, dry ground away from the coast. Polar bears, with their keen sense of smell, would find and dig up the coastal ice cellars (SRBA 2003b).

Based on the 2003 interviews, Atqasuk hunters traveled east as far as Fish and Judy creeks (Map J-6). During the winter, resources sought in the eastern portion of the current Atqasuk use area include fish in the Ikpikpuk River and lakes west of Teshekpuk Lake, and wolf, wolverine, and caribou. The harvest of caribou in this eastern area, which is incidental to the pursuit of wolves and wolverines, takes Atqasuk hunters far from the community on several extended trips each winter. Atqasuk hunters encounter furbearer and caribou hunters from other communities on these extensive travels. The Kalikpik and Kogru river area and the Fish and Judy creeks area are occasionally used in the winter by Atqasuk hunters traveling by snowmachine, primarily in search of wolf and wolverine. The Kalikpik and Kogru river area is a "homeland" for several Atqasuk families, who in the past traveled by boat to harvest caribou, birds, and fish in this area.

During the summer and fall, subsistence use areas for caribou, fish, berries, and waterfowl are primarily centered around Atqasuk, generally within 50 miles of the community. The harvest of resources near Atqasuk, both in the summer and winter, consists of day trips involving snowmachines, all-terrain vehicles, and boats, depending on the season. However, one subsistence user said he would go to one harvest area for a week, and then he would go home for a week or two, gas up, and go to another harvest area (SRBA 2003b).

It is not uncommon for winter hunters on snowmachines to encounter hunters from other communities. At these times, the hunting area of one community overlaps with the hunting area from another community. One Atqasuk hunter, who took several long winter hunting trips, said that he does not go to the area above Umiat, instead leaving "that country to those guys in Nuiqsut. They come up and hunt all over that area in moose season" (SRBA 2003b). Hunters make use of camps and cabins belonging to other hunters, often relatives from other communities, to support their hunting trips. Subsistence fur hunters travel to the Inigok area and center their hunts from there, since they may buy fuel for snowmachines at the Inigok camp (SRBA 2003b). The limited Atqasuk interviews indicated that Atqasuk hunters do not hunt regularly in the Nuiqsut or Colville River areas, traveling to Nuiqsut only for special occasions, such as funerals.

### J.9.4.1 Caribou

Caribou is the most important resource, by weight, harvested by Atqasuk residents. Although the late summer-early fall harvest is the most important, caribou are harvested every month of the year (Figure J-4). Caribou migration patterns and limited access prohibit hunting in the late spring and early summer. A subsistence harvest survey conducted by the NSB Department of Wildlife Management, covering the period from July 1994 to June 1995, noted 187 reported caribou harvested by Atqasuk hunters, approximately 57 percent of the total subsistence harvest in edible pounds (Hepa et al. 1997). Caribou are hunted by boat and snowmachine, and on foot from hunting camps along the Meade, Inaru, Topaguruk and Chipp river drainages (which also are used for fishing). Caribou hunting by snowmachine involves considerable travel over a widespread area and is generally incidental to furbearer hunting (Schneider et al. 1980; ACI et al. 1984).

### J.9.4.2 Fish

Fish is a preferred food in Atqasuk; respondents indicated that fish is the second most important resource in quantity harvested (ACI et al. 1984). Summer gillnetting, hook and line, late fall and winter jigging through ice, and winter gillnetting under the ice are the four most common fishing techniques. The most productive season for gillnetting begins in June and runs through to fall and early winter. The most prevalent subsistence fishing activity is catching humpback whitefish and least cisco in gillnets. Also caught are broad whitefish, burbot, grayling, and chum salmon (only in some years), all of which are fished with gillnets, baited hooks, and jigging (Craig 1987). Fall and early winter is the preferred time for fishing, when water levels drop in the Meade River and the water becomes clearer. Nets are most commonly set close to the community. During the fall, fishing continues under the ice in the Meade River and in nearby lakes (Schneider et al. 1980; ACI et al. 1984; NSB 1998). Narvaqpak (southeast of Atqasuk) is a popular fishing area (NSB 1998). Most fishing occurs along the Meade River, only a few miles from the village; however, fish are also pursued in most rivers, streams, and deeper lakes of the region. Fish camps are also located on two nearby rivers, the Usuktuk and the Nigisaktuvik, and downstream on the Meade River, near the Okpiksak River (Craig 1987).

Humpback whitefish and least cisco accounted for 96 percent of the summer catch in 1983. The summer gillnet fishery in the Meade and Usuktuk rivers produced a harvest of approximately 8,450 pounds of fish. Adding catches with other gear (angling) and winter catches (1,100 pounds and 2,700 pounds, respectively), the total harvest was approximately 12,250 pounds. The annual per capita catch in 1983 was about 43 pounds, with a total of 231 residents in the village (Craig 1987). A subsistence-harvest survey conducted by the NSB Department of Wildlife Management, covering the period from July 1994 to June 1995, reported that fish harvested by Atqasuk hunters represented 37 percent of the total subsistence harvest in edible pounds (Hepa et al. 1997).

### J.9.4.3 Migratory Birds

Atqasuk residents harvest migratory birds, especially white-fronted geese, from late April through June when they begin to appear along rivers, lakes and the tundra, following the snowline north (Figure J-4; NSB 1998). Hunters also harvest ptarmigan at this time. From late August through September, waterfowl are hunted continually through June and July along the major rivers (e.g., Meade River and its tributaries), and on numerous lakes and ponds. Ptarmigan are also heavily hunted during the fall (NSB 1998). Waterfowl eggs are gathered in the immediate vicinity of the community for a short period in June (ACI et al. 1984). The subsistence harvest survey, conducted by the NSB Department of Wildlife Management, reported that bird harvests by Atqasuk hunters represented 3 percent of the total subsistence harvest in edible pounds (Hepa et al. 1997).

## J.10 Nuiqsut

Nuiqsut's population was 443 in 2002 (ADCED 2003). Important subsistence resources for Nuiqsut include bowhead whale, caribou, fish, waterfowl, ptarmigan, and, to a lesser extent, seals, muskox, and Dall sheep. Polar bear, beluga whale, and walrus may be taken opportunistically while in pursuit of other subsistence species. Much of Nuiqsut's contemporary terrestrial subsistence harvest area lies within the proposed Planning Area. Nuiqsut's

subsistence harvest area for the period 1973 to 1986 is depicted in Map J-7. Specific subsistence harvest areas for major subsistence resources for Nuiqsut, derived from the 2003 interviews conducted in the community for the *Alpine Satellite Development Plan EIS*, are depicted in Map J-8 (SRBA 2003b). The annual cycle of subsistence activities in Nuiqsut is indicated in Figure J-7.

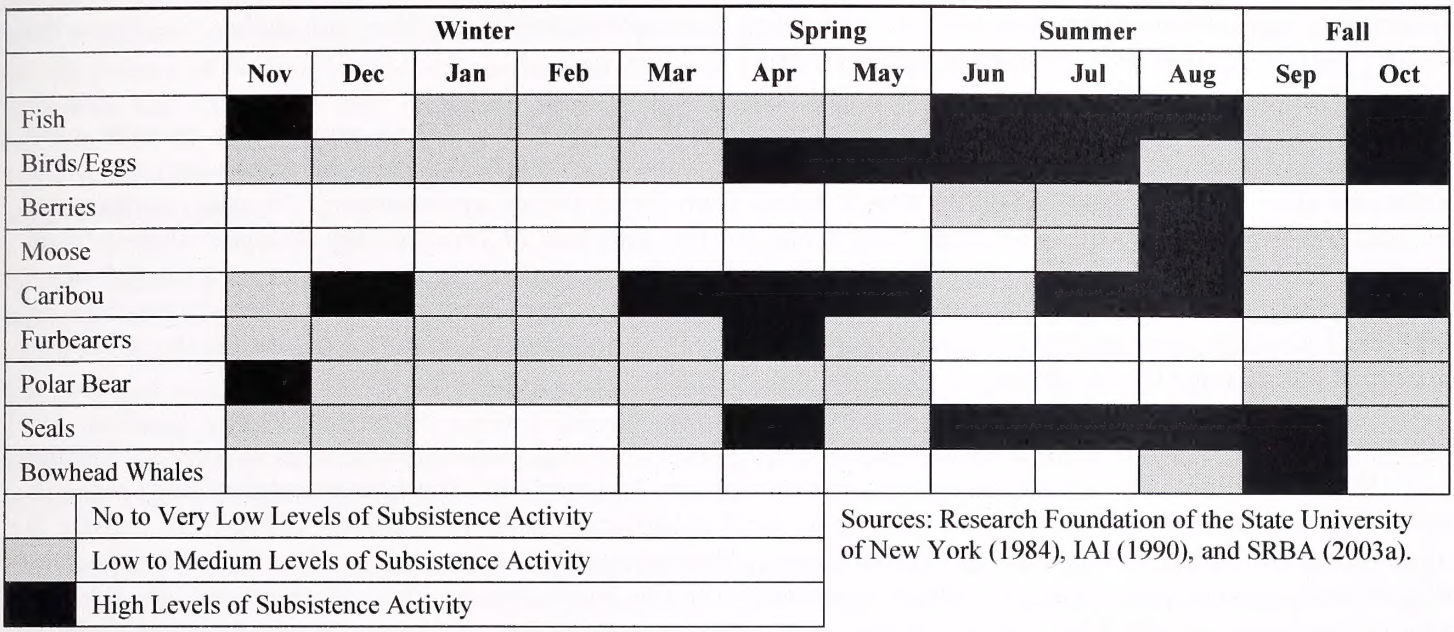



**Figure J-7. Annual Cycle of Subsistence Activities – Nuiqsut.**

The Iñupiat community of Nuiqsut has subsistence harvest areas in and adjacent to the Planning Area, as shown in Maps J-7 through J-13. Nuiqsut's marine subsistence harvest area includes the Beaufort Sea, from Cape Halkett in the west to Flaxman Island in the east, and up to 30 miles off shore (Maps J-11 and J-12). The Cross Island vicinity is the central location for Nuiqsut's subsistence bowhead whale hunting. Before oil development at Prudhoe Bay, the onshore area from the Colville River Delta in the west to Flaxman Island in the east, inland to the foothills of the Brooks Range, and especially up the drainages of the Sagavanirktok, Colville, Itkillik and Kuparuk rivers, were historically important to the Iñupiat for subsistence harvests of caribou, waterfowl, furbearers, fish, and polar bears. Nuiqsut hunters use the general vicinity of Teshekpuk Lake to harvest caribou, wolves, and wolverines, (Figures J-9 and J-10) and several Nuiqsut families, along with relatives in Barrow and Atqasuk, share use rights to cabins, camps, and allotments in the area and consider it their homeland.

In addition to bowhead whales, seals and eiders historically were hunted offshore as far east as Flaxman Island (Maps J-11 and J-12). Commercial whaling near and within the barrier islands during the late 1800s has also been documented (Brower *in* NSB 1980). Bowhead whales have also been observed inshore of the barrier islands, an area that has recently been mentioned as a whale feeding area (Nauwigewauk *in* Shapiro et al. 1979; Akootchook *in* USDOI MMS 1979; Brower *in* NSB 1980; Long *in* Dames and Moore 1996; and Nukapigak *in* USDOI MMS 1998).

## J.10.1 Nuiqsut Subsistence Activities

A diverse seasonal abundance of terrestrial mammals, fish, birds, and other resources is available in the immediate area surrounding Nuiqsut. Traditional subsistence activities in the Nuiqsut area revolve around caribou, marine mammals, and fish, with moose, waterfowl, and furbearers as important supplementary resources. Nuiqsut's location on the Colville River, some 35 miles upstream from the Beaufort Sea, is a prime area for fish and caribou harvests, but is less advantageous for marine mammal harvests (ADCED 2003). The Colville River, which is the largest river system on the North Slope, supports the largest overwintering areas for whitefish (Craig 1989).

Twenty-seven families from Barrow permanently resettled Nuiqsut in 1973. The Nuiqsut area was formerly a place where Iñupiat and Athabaskan people gathered to trade and fish, maintaining connections between the Nunamiut of the inland areas and the Taremiut of the coast (Brown 1979). The ANCSA allowed Iñupiat from Barrow who wished to live in a more traditional manner to resettle in Nuiqsut, and many of those who moved there had some family connection to the area (IAI 1990). Easy access to the main channel of the Colville River for fishing, hunting, and ease of movement between upriver hunting sites and downriver whaling and sealing sites, were the primary reasons for resettling in the area (Brown 1979).

Nuiqsut is 1 of 10 Alaskan Eskimo whaling communities. Many of those who resettled in Nuiqsut were experienced whalers and crew who remembered past whale harvests before the temporary abandonment of the settlement (IAI 1990). Nuiqsut whale hunting is based from Cross Island, approximately 70 miles northeast of Nuiqsut and approximately 15 miles from West Dock, on the west side of Prudhoe Bay. Nuiqsut whalers travel approximately 100 miles from Nuiqsut to the Cross Island whaling camp. Nuiqsut whaling occurs in the fall when the whales migrate closer to shore, because the spring migration path is too distant from shore for effective hunting with small boats. Nuiqsut residents also participate in Barrow's spring whale hunt through close family ties in that community (Fuller and George 1999).

Subsistence activities are important components of the Nuiqsut economy, and of local Iñupiat culture and identity (IAI 1990). A 1993 ADFG subsistence study showed that nearly two-thirds of all Nuiqsut households received more than half of their meat, fish, and birds from local subsistence activity (Pedersen 1995). This activity is supported by the cash component of the mixed economy. Nuiqsut is situated closer to current and foreseeable areas of petroleum development than any other community on the North Slope. This development has deterred subsistence resource users from hunting, fishing, and gathering at their former harvest areas east of the Colville River and at coastal areas such as Oliktok Point (IAI 1990, Fuller and George 1999). Subsistence food use and harvest is important for residents of Nuiqsut who have lived in the community for more than 10 years. As employment increases in Nuiqsut, jobs are being filled by people who move into the community from elsewhere, and who may not have the time, knowledge, or inclination to attempt to harvest subsistence foods in the Nuiqsut area. As long-term local residents continue to be underemployed, subsistence foods continue to be a lower cost alternative to imported foods (Circumpolar Research Associates 2002). However, a definitive link between household wage income and household subsistence productivity has not been demonstrated; the former is apparently dependent on education levels, and the latter on the number of capable producers in the household (Pedersen et al. 2000).

## J.10.2 Contemporary Seasonal Round

The seasonal availability of many important subsistence resources directs the timing of subsistence harvest activities (Figure J-7). Fishing may occur year-round, but is most common from ice breakup (late June) through November (Fuller and George 1999). Beginning in March, Nuiqsut residents hunt ptarmigan. Waterfowl hunting begins in the spring, and hunters typically harvest ducks and geese while participating in other subsistence activities, such as jigging for burbot or lingcod (IAI 1990). Caribou are hunted year-round, but primarily during the late summer and fall months. Moose hunting takes place in August and September, in boat-accessible hunting areas south of Nuiqsut (Fuller and George 1999). August is the primary harvest month for caribou and moose because water levels are right for traveling upriver or on the coast by boat, the animals are usually in their best condition, and moose are legal to hunt in Game Management Unit 26 for subsistence harvesters. Bowhead whaling usually occurs in September, when the whales migrate closer to the shore. Nuiqsut hunters harvest few polar bears, but when they are harvested it is often after the fall whaling season. If weather and ice conditions permit, summer net fishing at fish camps, or near the community, begins in June or July. Gill netting at campsites is most productive between October and mid-November. Jigging for grayling also occurs in the fall. Furbearer hunters pursue wolves and wolverines through the winter and spring, primarily in mid-March and April. Furbearer hunting can take place anytime during the winter; however, most hunters avoid going out in the middle of winter because of poor weather conditions and lack of daylight (IAI 1990).

## J.10.3 Subsistence Harvests

The ADFG collected subsistence harvest data for Nuiqsut in 1985 and 1993 and selected 1993 as the most representative year for subsistence harvest data in Nuiqsut (Tables J-5 and J-6). Nuiqsut's total annual subsistence harvests was 160,035 pounds in 1985 and 267,818 pounds in 1993. The 1993 harvest of 742 pounds per capita of wild resources represents approximately 2 pounds per day per person. In 1985, fish and land mammals accounted for 86 percent of Nuiqsut's total subsistence harvest, and marine mammals contributed 8 percent. In 1993, fish, terrestrial mammals, and land mammals each accounted for approximately one-third of the total subsistence harvest. The importance of subsistence to Nuiqsut residents is further reflected in the high participation rates in 1993 by households that use (100 percent), harvest (90 percent), try to harvest (94 percent), and share (98 percent) subsistence resources.

In 1985 and 1994, Nuiqsut harvested no bowhead whales, and relied on sharing with other communities for marine mammal products. The community harvested two bowhead whales in 1992 and three bowhead whales in 1993. In years when bowhead whale, fish, and terrestrial mammal subsistence harvests have been successful, each whale has provided nearly one-third of the subsistence resource harvest (Tables J-5 and J-6; Fuller and George 1999). In 1992, bowhead whale (32 percent), caribou (22 percent), and fish (25 percent) comprised 79 percent of Nuiqsut's annual subsistence harvest. In 1993, bowhead whale (29 percent), whitefish (29 percent), and caribou (31 percent) comprised 88 percent of Nuiqsut's annual subsistence harvest (Table J-6; ADFG 2001).

The 1994-1995 year was unusual in that Nuiqsut crews harvested no whales. Caribou contributed 58 percent of edible pounds of wild foods for the sampled period, fish contributed 30 percent, moose and birds each contributed 5 percent, marine mammals contributed 2 percent, and wild plant foods contributed less than 1 percent of all edible pounds harvested (Brower and Hepa 1998). The majority of Nuiqsut residents participated in subsistence harvest activities, with 66 percent successful, unsuccessful, or out hunting at the time of the interviews, 21 percent not attempting to harvest, and the balance not wishing to be interviewed (5 percent), out of town (7 percent), or unable to be contacted (1 percent). Eighty-seven percent of harvest instances resulted in resource sharing.

## J.10.4 Contemporary Subsistence Use Areas

Pedersen (1979, In Prep.) documented Nuiqsut "lifetime" and 1973 to 1986 land use areas (Map J-7). Brown (1979) and Hoffman et al. (1988) also documented Nuiqsut subsistence use areas in the 1970s, which are incorporated within the lifetime use areas depicted in Pedersen (1979). Pedersen's 1973-1986 subsistence land use documentation, as compared to Pedersen's Nuiqsut lifetime use areas and other documentation of Nuiqsut subsistence use areas, indicates that Nuiqsut resource harvesters use a larger area offshore and a larger area to the west, including northwest to Barrow, going to the south to Anaktuvuk Pass; and shows changes around industrial development to the east (Maps J-7 and J-8). It should be noted that when the 1970s research was conducted, Nuiqsut had only been resettled since 1973, and hunters, who were relearning the land, were not using the entire area that was originally used by people from the Colville River Delta (IAI 1990). Thus, Pedersen (In Prep.) shows a larger Nuiqsut subsistence use area for 1973-1986 than Pedersen (1979) showed for lifetime use areas or Brown (1979) depicted from his limited interviews. This change likely reflects Pedersen's continued research, as well as Nuiqsut hunters' expanded use as residents resettled their traditional area.

SRBA (2003b) conducted 21 interviews with subsistence resource users in Nuiqsut in June and July of 2003. The Kuukpik Subsistence Oversight Panel helped arrange the interviews and provided translation as needed. Interviewees included a variety of currently active resource users, both male and female, young hunters, productive middle-aged hunters, and active elders who still harvest subsistence foods and train the younger hunters. Interviews were conducted using large-scale (1:250,000) USGS topographic maps with overlays to record information. One of the goals of the interviews was to identify recent Nuiqsut subsistence use areas for key resources, such as caribou, fish, waterfowl (geese and eiders), furbearers (wolf and wolverine), moose, seal, bowhead whales, and berries. The recent period, as defined for these interviews, included the last 10 years. Map J-8 depicts the recent subsistence use areas for all resources for the 21 Nuiqsut residents interviewed in 2003.

**Table J-5. Nuiqsut Subsistence Harvests and Subsistence Activities for 1985, 1992, and 1993.**

| Resource | Percentage of Households | | | | | Estimated Harvest | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Use | Try to Harvest | Harvest | Receive | Give | Number | Total Pounds | Mean Household Pounds | Per Capita Pounds | % Total Harvest |
| **1985** | | | | | | | | | | |
| All resources | 100 | 98 | 98 | 100 | 95 | | 160,035 | 2,106 | 399 | 100 |
| Fish | 100 | 93 | 93 | 78 | 83 | 68,153 | 70,609 | 929 | 176 | 44 |
| Salmon | 60 | 43 | 40 | 23 | 23 | 441 | 1,366 | 18 | 3 | 1 |
| Non-salmon | 100 | 93 | 93 | 75 | 83 | 67,712 | 69,243 | 911 | 173 | 43 |
| Land mammals | 100 | 95 | 93 | 70 | 85 | 1,224 | 67,866 | 893 | 169 | 42 |
| Large land mammals | 98 | 90 | 90 | 70 | 80 | 536 | 67,621 | 890 | 169 | 42 |
| Small land mammals | 65 | 63 | 58 | 13 | 23 | 688 | 245 | 3 | 1 | <1 |
| Marine mammals | 100 | 48 | 23 | 100 | 30 | 59 | 13,355 | 176 | 33 | 8 |
| Birds and eggs | 98 | 95 | 95 | 60 | 80 | 3,952 | 8,035 | 106 | 20 | 5 |
| Vegetation | 38 | 50 | 18 | 20 | 10 | | 169 | 2 | 0 | 0 |
| **1992** | | | | | | | | | | |
| All resources | | | | | | | 150,196 | 1,430 | 359 | 100 |
| Fish | | | | | | | 51,955 | 495 | 124 | 35 |
| Land mammals | | | | | | | 41,503 | 395 | 99 | 28 |
| Marine mammals | | | | | | | 52,749 | 502 | 126 | 35 |
| Birds and eggs | | | | | | | 3,924 | 37 | 9 | 3 |
| Vegetation | | | | | | | 65 | 1 | 0 | |
| **1993** | | | | | | | | | | |
| All resources | 100 | 94 | 90 | 98 | 92 | | 267,818 | 2,943 | 742 | 100 |
| Fish | 100 | 81 | 81 | 94 | 90 | 71,897 | 90,490 | 994 | 251 | 34 |
| Salmon | 71 | 45 | 36 | 47 | 39 | 272 | 1,009 | 11 | 3 | <1 |
| Non-salmon | 97 | 79 | 79 | 90 | 87 | 71,626 | 89,481 | 983 | 248 | 33 |
| Land mammals | 98 | 77 | 76 | 94 | 82 | 1,290 | 87,390 | 960 | 242 | 33 |
| Large land mammals | 98 | 76 | 74 | 92 | 82 | 691 | 87,306 | 959 | 242 | 33 |
| Small land mammals | 53 | 45 | 42 | 18 | 27 | 599 | 84 | 1 | 0 | <1 |
| Marine mammals | 97 | 58 | 37 | 97 | 79 | 113 | 85,216 | 936 | 236 | 32 |
| Birds and eggs | 90 | 77 | 76 | 69 | 73 | 3,558 | 4,325 | 48 | 12 | 2 |
| Vegetation | 79 | 71 | 71 | 40 | 27 | | 396 | 4 | 1 | 0 |

Sources: Fuller and George (1999), ADFG (2001), and SRBA (2003a).

When compared with the earlier documented Nuiqsut use areas, the 2003 information depicts a similar use area, with some notable variation. The 2003 interviews did not focus on the area west of Barrow and hence did not capture the travel between Nuiqsut and Barrow, and associated hunting. The western extent is similar, but with some minor variation, likely a result of interviewing different hunters in the different studies. During the 2003 interviews, it became apparent that the southern extent of Nuiqsut's land use extended beyond the map used for the interviews; therefore, the 2003 data do not reflect Nuiqsut's southern subsistence extent. As noted in Pedersen et al. (2000), ADFG Division of Subsistence (2001), SRBA (2003b), and scoping testimonies, some formerly used areas depicted in lifetime use area maps and the 1973-1986 use areas (the Prudhoe Bay area, for example) are no longer accessed because of industrial development.

**Table J-6. Selected Nuiqsut Subsistence Harvests for 1985, 1992, 1993, and 1994-1995.**

| Resource | Estimated Harvest | | | | |
|---|---|---|---|---|---|
| | Number | Total Pounds | Mean Household Pounds | Per Capita Pounds | % of Total Harvest |
| **1985** | | | | | |
| Caribou | 513 | 60,021 | 790 | 150 | 38 |
| Whitefish | 58,733 | 59,701 | 786 | 149 | 37 |
| Bowhead whale | 0 | 7,458 | 98 | 19 | 5 |
| Geese | 1,345 | 6,045 | 80 | 15 | 4 |
| Moose | 13 | 6,650 | 88 | 17 | 4 |
| Seals | 57 | 4,431 | 58 | 11 | 3 |
| Burbot | 669 | 2,675 | 35 | 7 | 2 |
| Char | 1,083 | 3,060 | 40 | 8 | 2 |
| Grayling | 4,055 | 3,650 | 48 | 9 | 2 |
| **1992** | | | | | |
| Bowhead whale | 2 | 48,715 | 464 | 117 | 32 |
| Caribou | 278 | 32,551 | 310 | 78 | 22 |
| Arctic cisco | 22,391 | 22,391 | 213 | 54 | 15 |
| Broad whitefish | 6,248 | 15,621 | 149 | 37 | 10 |
| Moose | 18 | 8,835 | 84 | 21 | 6 |
| **1993** | | | | | |
| Caribou | 672 | 82,169 | 903 | 228 | 31 |
| Bowhead whale | 3 | 76,906 | 845 | 213 | 29 |
| Whitefish | 64,711 | 77,671 | 854 | 215 | 29 |
| Seals | 109 | 8,310 | 91 | 23 | 3 |
| Grayling | 4,515 | 4,063 | 45 | 11 | 2 |
| Moose | 9 | 4,403 | 48 | 12 | 2 |
| Burbot | 1,416 | 5,949 | 65 | 16 | 2 |
| Char | 618 | 1,748 | 19 | 5 | 1 |
| Geese | 1,459 | 2,314 | 25 | 6 | 1 |
| **1994-1995** | | | | | |
| Caribou | 258 | | | | |
| Whitefish | 14,532 | | | | |
| Seals | 24 | | | | |
| Grayling | 462 | | | | |
| Moose | 5 | | | | |
| Burbot | 91 | | | | |
| Char | 8 | | | | |
| Geese | 457 | | | | |
| Berries | 14 | | | | |

Sources: Brower and Opie (1997; for 1994-1995); Fuller and George (1999; for 1992); ADFG (2001; for 1985 and 1993); and SRBA (2003a).

### J.10.4.1 Bowhead Whale

Although Nuiqsut is not located on the coast, bowhead whale are still a major subsistence resource. Bowhead whaling is usually undertaken from Cross Island between late August and early October, with the exact timing depending on ice and weather conditions (Figure J-7 and Map J-12). Ice conditions can extend the season up to 2 months or restrict it to less than 2 weeks. Unlike Barrow spring whaling, where the hunt is staged from the edge of

ice leads using skin boats, Nuiqsut whalers use aluminum skiffs with outboard motors to hunt bowhead whales in open water in the fall. Bowhead whales are most often harvested by Nuiqsut residents within 10 miles of Cross Island, but occasionally hunters travel much further from the island. Historically, the entire coastal area, from Nuiqsut east to Flaxman Island and the Canning River Delta, has been used for whaling; however, the area to the west of Cross Island has not been as productive as areas closer to the island, and whaling too far to the east requires towing the whales back to Cross Island for butchering. This long trip creates the potential for meat spoilage (IAI 1990). Nuiqsut whalers have not successfully harvested bowhead whales consistently in the past (20 whales from 1972-1995), but their success has improved in recent years. Unsuccessful harvests were common in the 1980s, with no whales taken in 1983-1985 or 1988; however, in the 1990s, the only unsuccessful years were 1990 and 1994 (USDOI MMS 1996a, USACE 1998). Nuiqsut Whaling Captains Association President, Frank Long, Jr., presented a history and summary of major concerns of Nuiqsut bowhead whaling in the *Proceedings of the 1995 Arctic Synthesis Meeting* (USDOI MMS 1996b). During the 1996 Nuiqsut Whaling Captains' Meeting, Thomas Napageak stated that "when they had that big seismic operation going on here at Kuvlum, no whales were spotted in this area, so we had to go 40 miles or so out there to get to those whales who were migrating" (Dames and Moore 1996).

#### Bowhead Whale Use Area

The recent Nuiqsut subsistence bowhead whale hunting area is depicted in Map J-12. The general Nuiqsut harvest area for bowhead whales is located off the coast between the Kuparuk and Canning rivers. Nuiqsut has been a bowhead whaling community since its reestablishment in 1973. Whalers currently travel to Cross Island to conduct fall bowhead whaling. In the past, they used Narwhal Island as a base, and still have structures there. Cross Island has cabins and equipment for hauling up and butchering the whales. Nuiqsut hunters typically travel out either the Nigliq or the main Colville channel of the Colville River Delta, depending on water levels, and travel along the coast, inside or just outside the barrier islands. Whalers may opportunistically harvest seals, caribou, and polar bears en route. After setting up camp, work groups may start fishing and hunting other species to support the whalers (SRBA 2003b).

### J.10.4.2 Beluga Whale

Nuiqsut residents have indicated that beluga whales are not significant to the subsistence cycle of the community, although some beluga whales are incidentally harvested during the bowhead whale harvest. In recent testimony, Thomas Napageak stated: "I don't recall a time when I went hunting for beluga whales. I've never seen a beluga whale here" (USDOI BLM 1998).

### J.10.4.3 Seals

Seals are hunted nearly year-round (Figure J-7), but the bulk of the seal harvest occurs during the open-water season. In the spring, seals may be hunted once the landfast ice goes out. Present day sealing is most commonly done at the mouth of the Colville, when it begins flooding after ice breakup in June. According to Thomas Napageak:

> ...when the river floods, it starts flowing out into the ocean in front of our village affecting the seals that include the bearded seals in the spring month of June... When the river floods, near the mouth of Nigliq River it becomes filled with a hole or thin spot in [the] sea ice that has melted as the river breaks up. When it reaches the sea, that is the time that they begin to hunt for seals, through the thin spot in the sea ice that has melted. They hunt for bearded seals and other types of seals (USDOI BLM 1998).

Nuiqsut resident Ruth Nukapigak recounts past trips to this same sealing area: "I love to follow my son Jonah every year just when the ice begins moving down there and it takes us 1 hour travel time to get there. That is where we go to hunt for seals" (USDOI BLM 1998). Nuiqsut elder Samuel Kunaknana, interviewed in 1979, noted that when the ice is nearshore in the summer, it is considered to be good for seal hunting (Kunaknana *in* Shapiro et al.

1979). Although seal meat is eaten, the dietary significance of seals primarily comes from seal oil, served with almost every subsistence meal. Seal oil is also used as a preservative for meats, greens, and berries. Seal skins are important in the manufacture of clothing; because of their beauty, spotted seal skins often are preferred for making boots, slippers, mitts, and parka trim. Ringed seal skins, however, are used to make clothing more often, because their harvest is more abundant than that of spotted seals. A 1993 ADFG subsistence survey in Nuiqsut indicated that 32 percent of the total subsistence harvest was marine mammals, and 3 percent of the total harvest was seals (Tables J-5 and J-6; ADFG 2001). Fuller and George (1999) estimated that 24 ringed seals, 16 bearded seals, and 6 spotted seals were harvested in 1992, and that overall, marine mammals (including bowhead whales) contributed 35 percent to the total subsistence harvest (Table J-5). A subsistence harvest survey conducted by the NSB Department of Wildlife Management, covering July 1994 to June 1995, reported a harvest of 23 ringed seals and a 2 percent contribution of marine mammals to the total subsistence harvest because no bowhead whales were harvested that season (Brower and Opie 1997, Brower and Hepa 1998).

#### Seal Use Areas

Ringed, spotted, and bearded seals are important subsistence resources for Nuiqsut hunters. As depicted in Map J-11, seals are harvested along the coast, and offshore from Cape Halkett in the west to Foggy Island Bay in the east. In the summer, Nuiqsut hunters harvest ringed and spotted seals in the Colville River as far south as Ocean Point. In the spring, hunters usually shoot seals in the water and on the ice edge (SRBA 2003b).

In April and May, hunters ride out to Harrison Bay on snowmobiles and look for breathing holes—cracks in the ice and open water where seals might surface to breath. By the second week in June, open waters on the Colville River and much of Harrison Bay allow hunters to take boats out on a route called "around the world." This route follows the Nigliq Channel to Harrison Bay, west to Atigaru Point, along the ice edge out as far as 28 miles, then to Thetis Island (called *Amauliqtuq*), east to Oliktok Point, and back south through the main channel of the Colville River. Thetis Island is used as a shelter when the weather turns bad. This route is also used to harvest eiders, and occasionally walruses (SRBA 2003b).

Seals are a culturally important subsistence species for food, skins, and barter. In historic times, seal oil lamps provided heat and light for Iñupiat dwellings and a condiment for dried foods. Seal meat and oil are still locally consumed and traded to Anaktuvuk Pass for dried caribou and other products. Seal skins are used for handicrafts and other articles, bartered, or sold (SRBA 2003b).

### J.10.4.4 Walruses

Alaska Department of Fish and Game subsistence survey data indicate that two walruses were harvested in the 1985-1986 harvest season, but no new walrus data for the community have been gathered since 1986 (ADFG 2001). Walruses are probably incidentally taken during seal hunting (NSB 1998).

### J.10.4.5 Polar Bears

The harvest of polar bears by Nuiqsut hunters begins in mid-September and extends into late winter. Polar bear meat is sometimes eaten, although little harvest data are available. Nuiqsut residents have indicated that polar bears are not a significant subsistence resource for the community and, if taken, would be an incidental harvest. According to Thomas Napageak's statement at the Beaufort Sea Sale 144 Public Hearings in Nuiqsut, "the taking of polar bear is not very important now" (USDOI MMS 1995). One polar bear was reported harvested between 1962 and 1982, and 20 were harvested between 1983 and 1995 (Stocker 1983, Schliebe 1995, Brower and Opie 1997, Brower and Hepa 1998, NSB 1998, ADFG 2001).

### J.10.4.6 Caribou

Nuiqsut hunters harvest several large land mammals, including caribou and moose. Caribou may be the most preferred mammal in Nuiqsuts' diet, and, during periods of high availability, it provides a source of fresh meat

throughout the year (Figure J-7). Subsistence caribou harvest data are shown in Table J-6 (Brower and Hepa 1998, ADFG 2001). In 1985, Nuiqsut hunters harvested an estimated 513 caribou, providing 60,000 edible pounds of meat, or 38 percent of the total subsistence harvest (ADFG 2001). Fuller and George (1999) estimated that 278 caribou were harvested in 1992. A 1993 ADFG subsistence study estimated a harvest of 672 caribou, providing 82,000 edible pounds of meat, or 31 percent of the total subsistence harvest (ADFG 2001). In 1993, 74 percent of Nuiqsut's households harvested caribou, 98 percent used caribou, 79 percent shared caribou with other households, and 79 percent received caribou shares (ADFG 2001). A subsistence harvest survey, covering July 1994 to June 1995, reported that Nuiqsut hunters harvested 258 caribou, which made up 58 percent of the total subsistence harvest in edible pounds (Brower and Hepa 1998). Brower and Hepa (1998) noted that number of caribou is low when compared to reported harvests for earlier years, even though no bowhead whales were taken that year. Explanations offered by local hunters for the decreased harvest were: 1) the need to travel longer distances to harvest caribou than in the past; 2) the increasing numbers of muskox that hunters believe keep caribou away from traditional hunting areas; 3) restricted access to traditional subsistence hunting areas due to oil exploration and development in these areas; and 4) disruption of caribou migration into traditional Nuiqsut harvest areas (Brower and Opie 1997, Brower and Hepa 1998, NSB 2003). Caribou harvest numbers may vary for a number of social or environmental reasons, but, regardless of harvest numbers, they are a key subsistence resource.

Cumulative Nuiqsut caribou harvests for 1993, 1994-1995, 2000, and 2001 are depicted in Figure J-8. There are monthly and seasonal differences in the proportion of caribou harvested, with summer harvests providing approximately 60 percent of the harvested caribou. For the 4 data years, July (23 percent of annual harvest) and August (24 percent) are the months with the greatest cumulative caribou harvests. September (8 percent) is normally consumed by whaling activity, and caribou hunting may be done en route to the whaling grounds to support the crews. According to several hunters, October (16 percent) is a preferred month for hunting caribou, as the caribou have accumulated a thick layer of fat for the winter. March (6 percent) represents the beginning of spring, with longer days and warmer weather encouraging hunters to go out on the land again and harvest caribou.

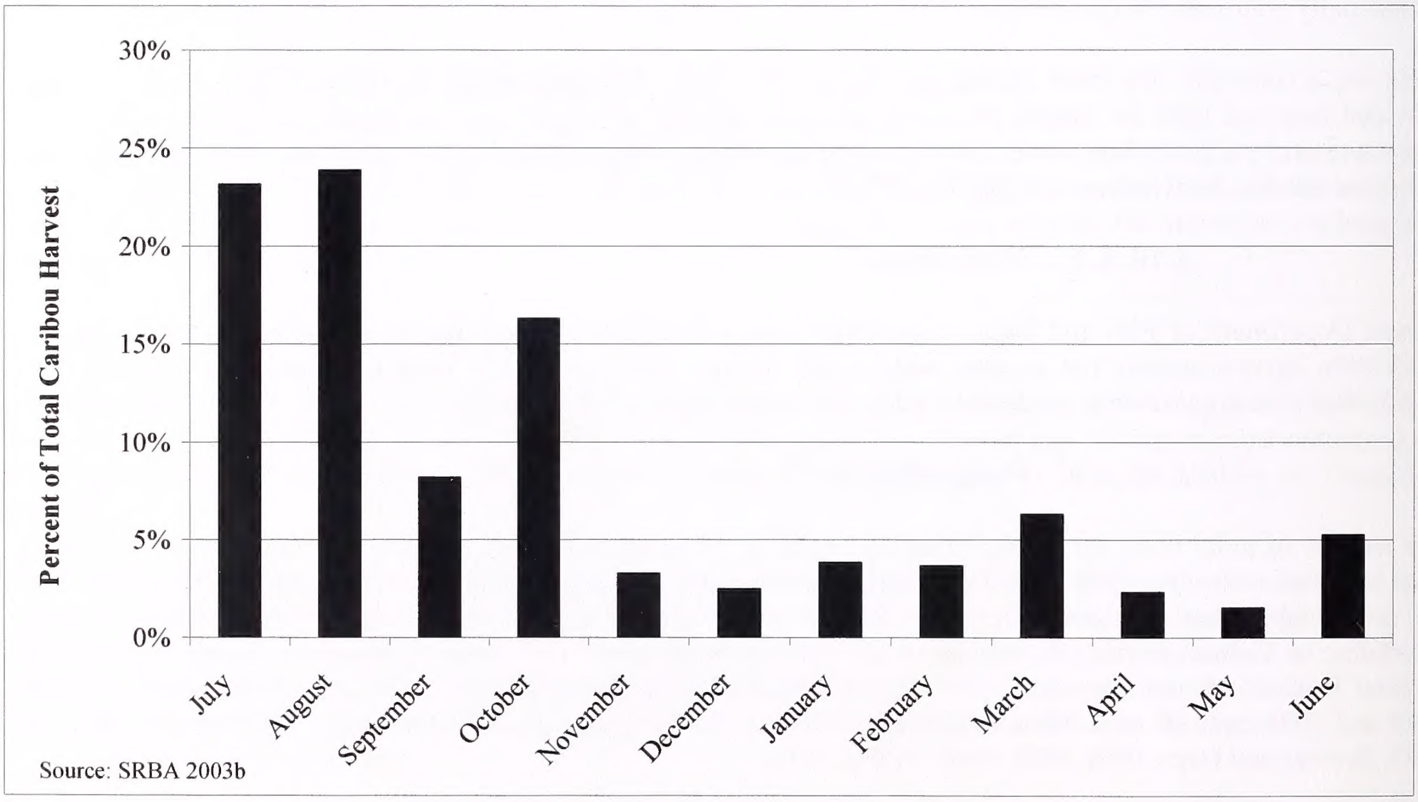



**Figure J-8. Nuiqsut Caribou Harvest by Month, 1993, 1994-1995, 2000, and 2001.**

### Caribou Use Areas

Harvest location data for caribou collected by the NSB and the ADFG, and from hunting area interviews conducted in Nuiqsut for the *Alpine Satellite Development Plan EIS* indicate that there are several primary harvest areas for caribou (Maps J-9 and J-13; Brower and Hepa 1998; ADFG 2001, 2003; NSB 2003; SRBA 2003b). North of Nuiqsut, these harvest locations include the Nuiqsut area, the Colville River Delta, the Nigliq Channel, and the Fish and Judy creeks area. To the south of Nuiqsut, the Colville River provides access to areas and sites such as Itkillikpaat, Ocean Point, the Itkillik River, Umiat, and the confluence of the Anaktuvuk and Chandler rivers. These areas are usually associated with Traditional Land Use Inventory sites, cabins, camps, and Native allotments with harvest locations for other species nearby. These harvest locations, which may be used in winter (October through May), summer (defined as the open water period, including June through September), or both, are accessed by foot, boat, all-terrain vehicle, and snowmachine.

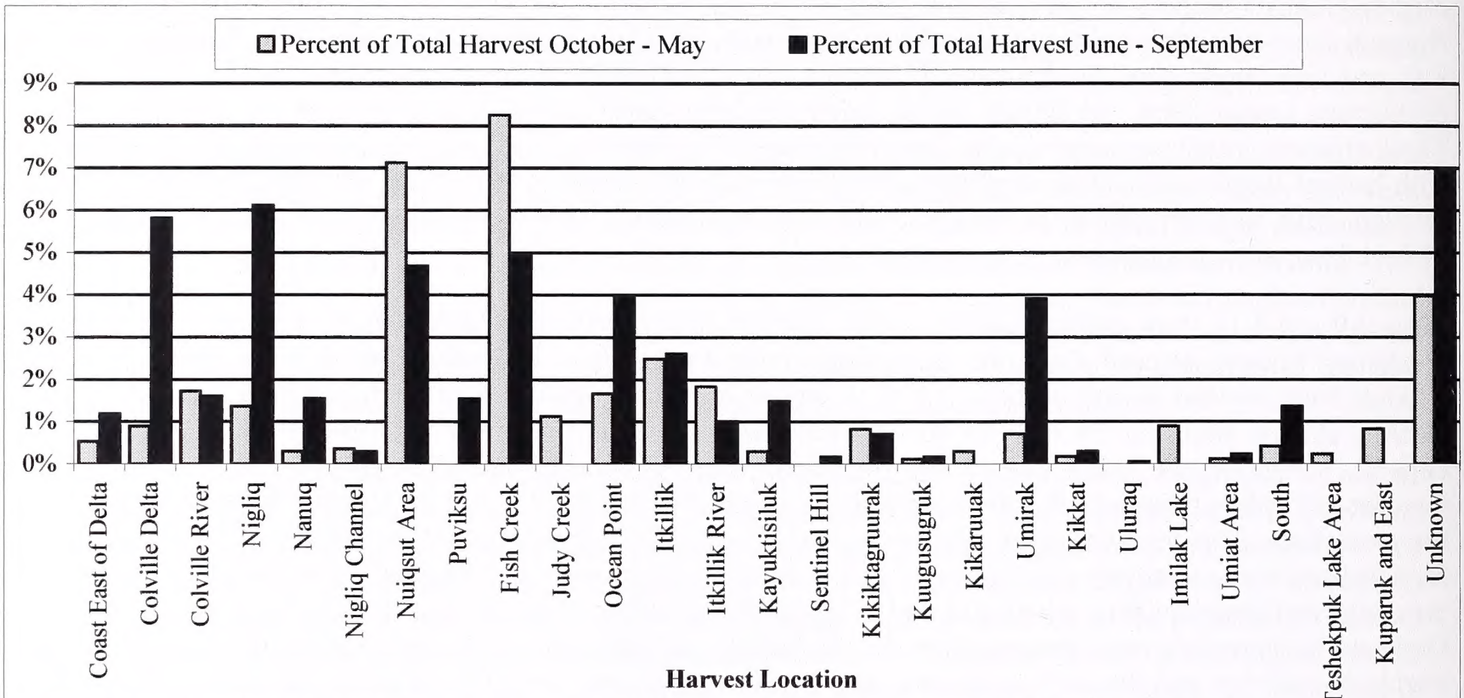
Maps J-9 and J-13 show caribou hunting areas. Summer hunting (Map J-13) is done by boat after the river ice breaks up; hunters proceed along the coast from Smith Bay east to the Sagavanirktok River Delta, including Oliktok Point, several barrier islands, and in all channels of the Colville River Delta and Fish and Judy creeks. Hunters also go south on the Colville River beyond Umiat, passing Itkillikpaat, Ocean Point, Signal Hill, and Umirak. Summer is the major caribou harvest season by proportion of individual caribou taken. In July, large numbers of caribou migrate to the coast and shallow waters of Harrison Bay and the Colville River Delta to escape the mosquitoes. This behavior gives subsistence hunters an opportunity to harvest the number of caribou adequate for subsistence in a relatively short amount of time. Because of the risk of spoilage, the harvested caribou must be processed and stored quickly, whether placed in ice cellars at camps or brought back to Nuiqsut and put in freezers. Outboard boats provide rapid transportation for the hunters and their harvest. August is a time of increased bot and warble fly activity, and the caribou disperse into smaller groups and go south, since coastal winds provide little relief from flies (SRBA 2003b).

Winter harvests occur after the rivers and lakes freeze over and snow covers the tundra, allowing for greater overland hunting range via snowmachines. Interviewed hunters have hunted from the vicinity of Admiralty Inlet and Teshekpuk Lake in the west, to the Franklin Bluffs area east of the Dalton Highway, south to Anaktuvuk Pass, and along the northern foothills of the Brooks Range. Hunters take caribou as needed while they pursue wolves, wolverines, and foxes southeast of Teshekpuk Lake, in the Brooks Range foothills, the Kuparuk Hills, and east of the Colville River. Subsistence caribou hunting, independent of the furbearer harvest, continues all winter throughout the Fish and Judy creeks area, along the Nigliq Channel, and south along the Colville and Itkillik rivers. During the coldest months, many hunters stay closer to Nuiqsut, venturing farther out as spring approaches (SRBA 2003b). March represents the beginning of spring, as the days grow longer and temperatures increase. Preparations for *Nalukataq* begin in March as senior whaling crew members hunt caribou and other resources for the celebration. In April, the snow is often inadequate to support travel over the tundra, limiting overland travel by snowmachines. Caribou are harvested near the village and along frozen waterways at this time, but as spring approaches, the caribou are often lean and not in the best condition (SRBA 2003b).

Nuiqsut residents take hunting trips upriver by boat in summer and fall, when moose and caribou may be harvested, and by snowmachine in winter, in pursuit of caribou and furbearers. Nuiqsut hunters also travel up the Itkillik River and to the Chandler and Anaktuvuk rivers by boat and snowmachine. There are many camps and cabins in the area of Fish and Judy creeks, throughout the Colville River Delta, and up the Colville River to the south, that are used for summer and winter caribou hunting (Map J-9). These camps often have drying racks and ice cellars for processing and storing harvested game, as well as caches of survival gear and supplies.

Figure J-9 depicts harvest amounts by season for caribou harvested at known locations in 1993, 1994-1995, 2000, and 2001. Figure J-9 represents a preliminary analysis of Nuiqsut subsistence harvest location data and not a definitive model of subsistence caribou harvests. Nuiqsut is the only community for which these data were available. Frequency of use and harvest numbers should not be construed as a quantitative measure of value. During both the summer and winter, the greatest number of caribou were harvested at Fish and Judy creeks (approximately 14 percent), in the Nuiqsut area (approximately 11 percent), and in the Colville River Delta,

including Nigliq and the Nigliq Channel (approximately 19 percent). The Nuiqsut area itself is the second largest (approximately 7 percent) winter harvest location and fourth largest (approximately 4 percent) summer harvest location.




Note: Data for 1994-1995, 2000 and 2001 are raw, uncorrected data, and the figure does not represent total harvest numbers.
Source: Alaska Department of Fish and Game (2003; unpublished Nuiqsut data 1993) and SRBA (2003b).

**Figure J-9. Nuiqsut Caribou Harvest by Season and Location, 1993, 1994-1995, 2000, and 2001.**

There are several reasons for the frequency of use of the Nuiqsut area as a harvest location, including proximity, accessibility in both summer (by boat) and winter (by snowmachine), coordination with work obligations, need to avoid spoiling the meat, lack of transportation or gas money, the general availability of caribou in both seasons, and a desire to combine caribou harvesting with fishing, waterfowl hunting, and berry picking. More distant harvest locations for caribou are associated with camps, cabins, and allotments where caribou are hunted, processed, and stored while other subsistence tasks (e.g., fishing and berry picking) are undertaken (Map J-9). It is a common practice for experienced Nuiqsut hunters to take younger, less experienced hunters to Fish and Judy creeks, Nigliq, the Colville River Delta, or Itkillikpaat during the summer and winter, stay at a cabin or camp site, set a net for fishing, and harvest caribou. These activities provide multiple traditional foods for the community through sharing and distribution upon the hunters' return. Furthermore, they serve to transfer to younger hunters a multi-generational knowledge of and identification with specific harvest, processing, and storage methods, and traditional harvest locations. These subsistence activities in the Planning Area, and nearby areas, reinforce the cultural identity of the community and residents' identification with their unique history.

### J.10.4.7 Fish

Fish provide the most edible pounds per capita of any subsistence resource harvested by Nuiqsut (Table J-5). Although variable by season and from year to year, fish provide a relatively stable, predictable, and substantive contribution to subsistence resource harvests. The subsistence harvesting of fish is not subject to seasonal limitations under federal fisheries management, and no permit is required for rural residents, a situation that adds to the importance of fish in the community's subsistence year-round. Nuiqsut has the largest documented subsistence fish harvest on the Beaufort Sea coast (Moulton et al. 1986; Moulton 1997). On occasion, fish may provide the only source of fresh, easily accessed subsistence foods.

Nuiqsut's location on the Nigliq Channel of the Colville River, with large resident fish populations, reflects the importance of fish to subsistence users. The river supports 20 species of fish, approximately half of which are taken by Nuiqsut residents (George and Nageak 1986). Local residents generally harvest fish during the summer and fall (Figure J-7). The summer, open-water harvest lasts from ice breakup to freezeup (early June to mid-September). The summer harvest covers a wide area and is longer than the fall/winter harvest in duration, and a greater number of species are caught. Broad whitefish, the primary species harvested during the summer, is the only anadromous species harvested in July. Thomas Napageak stated:

> In the summer when it is time to fish for large, round-nosed whitefish, the place called Tirragruag gets filled with them as well as the entrance to Itkillik. Nigliq River gets filled with nets all the way to the point where it begins. We do not go to Kuukpiluk in the summer months. Then we enter Fish Creek...another place where they fish for whitefish is Nuiqsagruaq (USDOI BLM and MMS 1998).

In July, lake trout, northern pike, broad whitefish, and humpback whitefish are harvested south of Nuiqsut. Traditionally, coastal areas were fished in June and July when melting ice created enough open water for seining fish. Nuiqsut elder Sarah Kunaknana said during a 1979 interview: "...in the little bays along the coast we start seining for fish. After just seining one or two times, there would be so many fish we would have a hard time putting them all away" (Shapiro et al. 1979). Salmon species reportedly have been caught in August, but not in large numbers. Pink and chum salmon are the most commonly caught (George and Nageak 1986). Arctic char is found in the main channel of the Colville River, but is not caught abundantly (George and Kovalsky 1986, George and Nageak 1986, ADFG 2001).

The fall/winter under-ice fish harvest begins after ice freezeup, when the ice is safe for snowmachine travel. Local families fish for approximately 1 month after freezeup, until the river ice is too thick to allow the setting of nets through holes in the ice. The Kuukpigruaq Channel is the most important fall fishing area in the Colville River region, and the primary species harvested are Arctic and least cisco. After freezeup, people continue to fish for whitefish (Napageak *in* USDOI BLM and MMS 1998). Nuiqsut resident Ruth Nukapigak recounts a recent winter fishing trip in December 1997: "I, myself, took my net out in December right before Christmas Day. I was catching whitefish in my net" (USDOI BLM and MMS 1998). Arctic and least cisco amounted to 88 and 99 percent of the harvest in 1984 and 1985, respectively. Humpback and broad whitefish, sculpin, and some large rainbow smelt are also harvested, but only in low numbers (George and Kovalsky 1986, George and Nageak 1986). A fish identified as "spotted least cisco" has also been harvested (this fish was not identified by Morrow [1980], but could be a resident form of least cisco [George and Kovalsky 1986]). Weekend fishing for burbot and grayling occurs at Itkillikpaat, 6 miles from Nuiqsut (George and Nageak 1986).

The summer fish catch in 1985 totaled about 19,000 pounds, mostly of broad whitefish. In the fall, approximately 50,000 pounds of fish were caught for an annual per capita catch of 244 pounds, and some of this catch was shipped to Barrow (Craig 1987). A 1985 ADFG subsistence survey estimated the edible pounds of all fish harvested at 176 pounds per capita, or approximately 44 percent of the total subsistence harvest (Table J-5). In 1992, 35 percent of the edible pounds of Nuiqsut's total subsistence harvest was fish, and by 1993, the estimate of edible pounds of all fish harvested had risen to approximately 251 pounds per capita, or approximately 34 percent of the total subsistence harvest (Table J-5). A subsistence harvest survey conducted by the NSB Department of Wildlife Management, covering July 1994 to June 1995, reported that the subsistence fish harvest provided 30 percent of the total subsistence harvest (Brower and Opie 1997, Brower and Hepa 1998).

Whitefish are eaten fresh (cooked), frozen, and dried. Salmon are harvested in low numbers and are usually eaten fresh. Because fish are an abundant and stable food source, and a source of fresh food during the midwinter months, fish are shared at Thanksgiving and Christmas feasts and given to relatives, friends, and community elders. Because fishing often involves the entire family, it serves as an important social activity in the community; most Nuiqsut families (81 percent of all households in 1993) participate in some fishing activity (Brower and Hepa 1998, ADFG 2001).

## Fish Use Areas

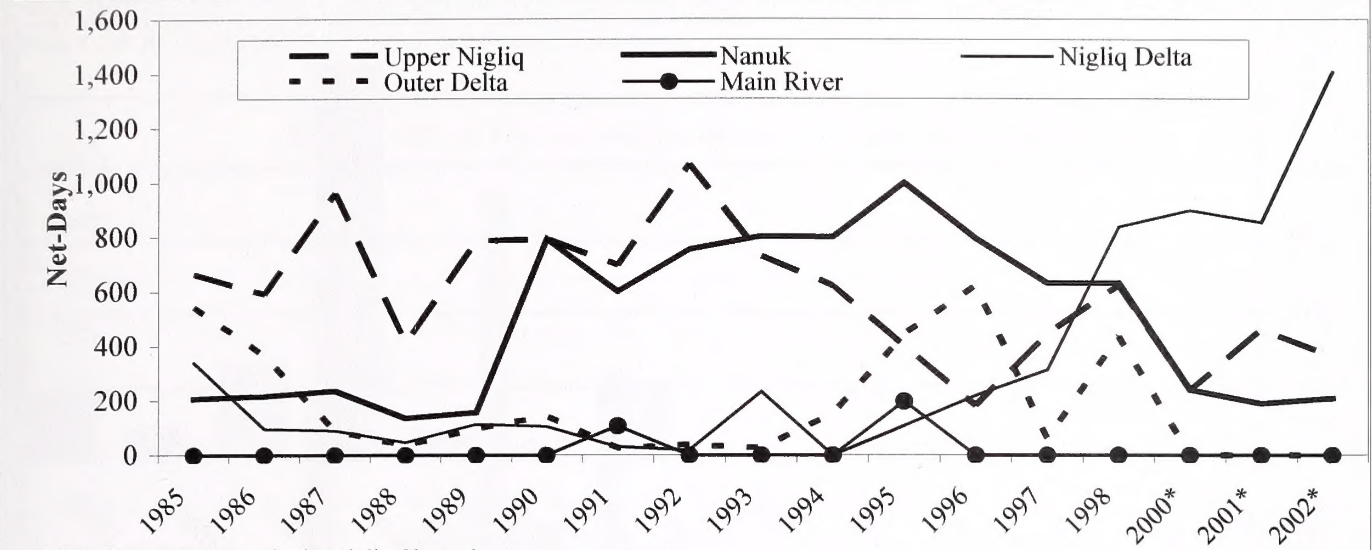
Nuiqsut resource users have a long history of subsistence fishing in the Colville River and its tributaries, from the Colville River Delta to the confluence with the Ninuluk Creek, the Nigliq Channel, nearby Fish and Judy creeks, and the innumerable lakes in the region. Nuiqsut fishermen also use coastal areas east to the Kuparuk River and fish around several barrier islands, including Thetis and Cross islands (Map J-10). Many families set nets near Nuiqsut in the Nigliq Channel when time, transportation needs, or funds do not permit longer trips from town, particularly during the school and work year. Cooperative arrangements are made between resource users wherein resources (such as time, equipment, gas, and labor) are pooled in exchange for shares of the harvest. Resource users often fish in conjunction with other subsistence activities, such as caribou and moose hunting and berry picking, especially in harvest areas with camps and cabins. Certain species of fish are only seasonally available, and must be harvested when present in the area. Nuiqsut fishers freeze or dry these fish for later consumption and barter. Other fish species are available year-round and provide a welcome change to the diet (and fresh food) during the winter and spring months (SRBA 2003b).

In general, fish comprise more than one-third of the subsistence harvest of Nuiqsut residents (Table J-5). This percentage varies with fish availability and the availability of other resources, such as caribou and bowhead whales (Brower and Hepa 1998). Subsistence fishing in Nuiqsut has been the subject of scientific research since 1985, when studies were undertaken in response to harvest failures that resource users associated with the construction of nearshore infrastructure for oil development (Moulton 2000). In addition, the NSB Department of Wildlife Management collected information on Nuiqsut subsistence fish harvests for 1994–1995, 2000, and 2001 (Brower and Hepa 1998, NSB 2003).

There are significant differences in methodology and sampling during the last 3 years of the 17-year Moulton studies (Moulton 2000, 2002), and between the Moulton and the NSB studies. From 1985 to 1998, Moulton collected data from five net sites (Upper Nigliq, Nanuq, Nigliq Delta, Outer Delta, and the main portion of the Colville River) in the Colville River Delta on subsistence harvests of Arctic cisco, least cisco, broad whitefish, and humpback whitefish. Skipping 1999, Moulton resumed data collection in 2000, but reported only the subsistence harvest on the Nigliq Channel sites (Upper Nigliq, Nanuq, and Nigliq Delta).

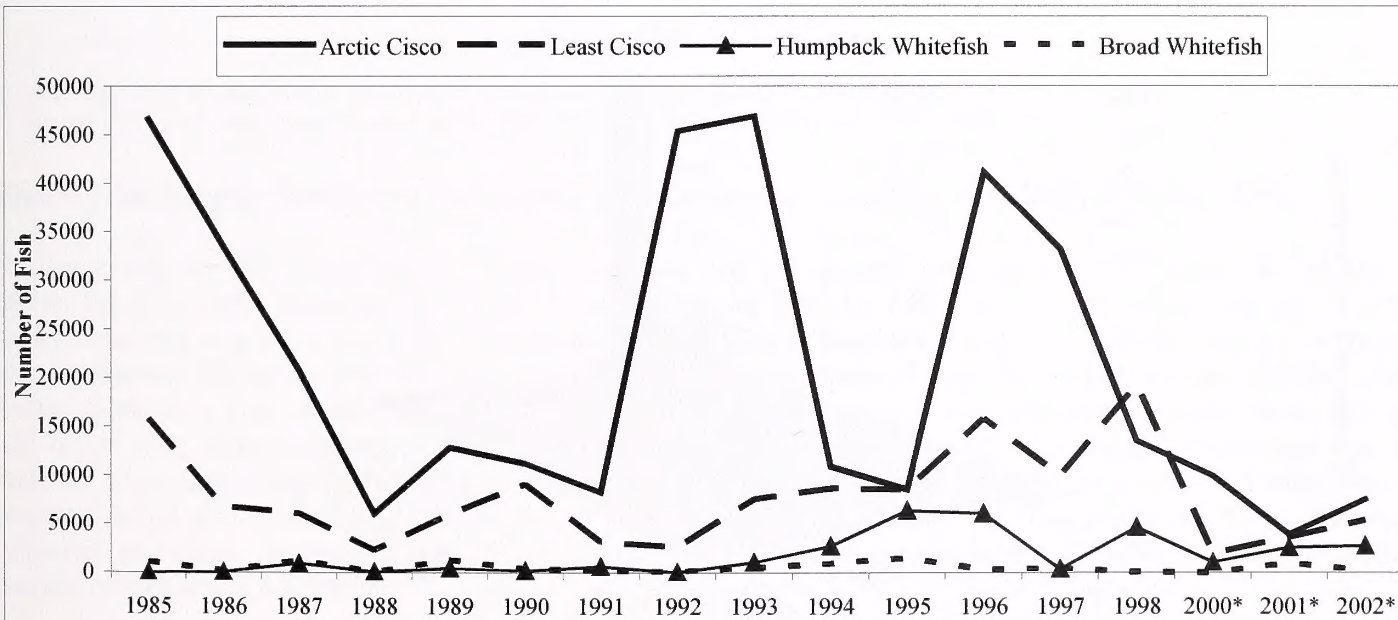
The data collected by the NSB are broader in scope, geographically and in the number of species covered, than the Moulton data. In addition to the cisco and whitefish species addressed by Moulton, harvest information collected by the NSB includes data for char, burbot, pike, salmon, and grayling. The NSB harvest locations reflect those reported in the 2003 Nuiqsut interviews (SRBA 2003b), with summer and winter fishing taking place in the Nigliq Channel, Colville River and Delta, and in Fish and Judy creeks, as well as other locations in specific seasons using both nets and angling gear (Map J-10; Brower and Hepa 1998). The relative value of different species to local resource users ranged from valued staples (e.g., cisco and whitefish) to the highly prized (e.g., burbot). Burbot, which are caught by jigging through holes in the ice in the Nigliq Channel and other Colville River Delta channels, the Colville River, and Fish and Judy creeks, are highly prized for their large livers and high fat content in the winter; however, they are harvested in numbers that do not compare with the volume of some other species (SRBA 2003b).

Figures J-10 and J-11 show the highly variable nature of the subsistence fish harvest in the Colville River Delta and Nigliq areas. Fishing effort in net-days ranged by area from 19 to 1,407 net days, although there is no clear correspondence between the harvest and harvest effort. In 1993, low efforts brought more fish, while high efforts in 2002 resulted in few fish harvested, even considering the reduced number of sites sampled. As shown in Figure J-11, the Arctic cisco harvest, at the five monitored set net harvest sites, ranged from a 1993 peak of nearly 47,000 to a 1988 low of approximately 6,100. This variability demonstrates the importance of having alternative species and harvest strategies available when poor fish harvests coincide with reduced terrestrial or marine mammal harvests.




* Net days represent only the Nigliq Channel.
Note: No data collected for 1999.
Source: Moulton (2002) and SRBA (2003b).

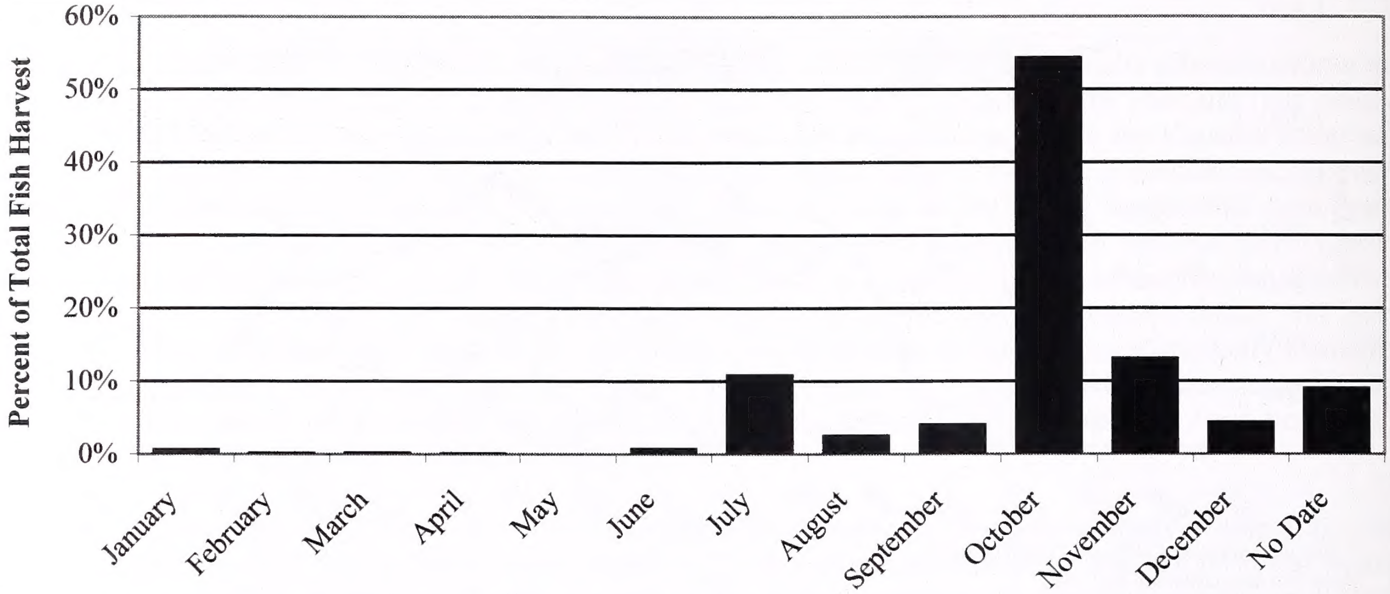
**Figure J-10. Estimated Fishing Effort in the Colville River Delta Fall Subsistence Fishery in Net Days.**




* Harvest numbers represent only the Nigliq Channel harvest.
Note: No data collected for 1999.
Source: Moulton (2002) and SRBA (2003b).

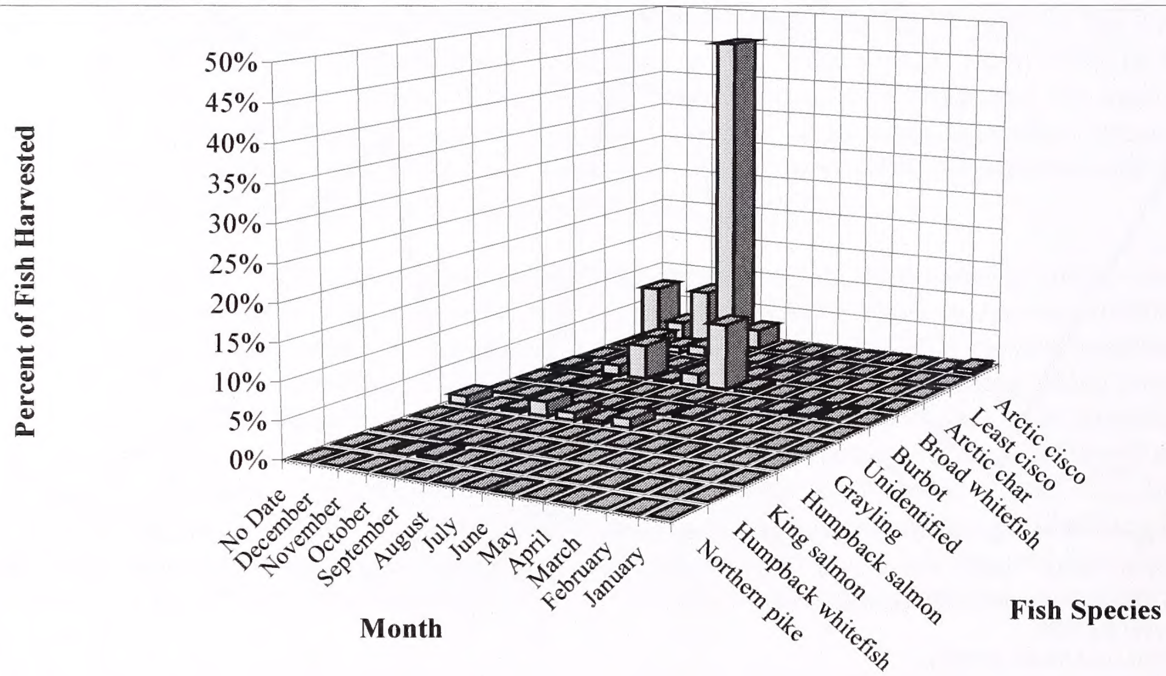
**Figure J-11. Estimated Whitefish and Cisco Harvests for the Colville River Delta Fall Subsistence Fishery, 1985-2002.**

The NSB subsistence harvest data for 1994-1995, 2000, and 2001 show that the greatest proportion of fish were harvested in October (54 percent), November (13 percent), July (11 percent), December (4 percent), and September (4 percent); however, undated fish harvests (9 percent) were the fourth largest group (Figure J-12). The large number of fish harvested reflects the importance of the resource in general and demonstrates the numerical dominance of Arctic cisco in the fall and winter harvest. Based on NSB subsistence harvest data for 1994-1995, 2000, and 2001, the majority of Arctic cisco were harvested in October, while harvests of broad whitefish peaked in July and October (Figure J-13).




Note: This figure is based on raw, uncorrected data and does not represent total harvest numbers.
Source: NSB (2003; unpublished Nuiqsut harvest data 1994-1995, 2000, and 2001) and SRBA (2003b).

**Figure J-12. Nuiqsut Fish Harvest by Month, 1994-1995, 2000, and 2001.**

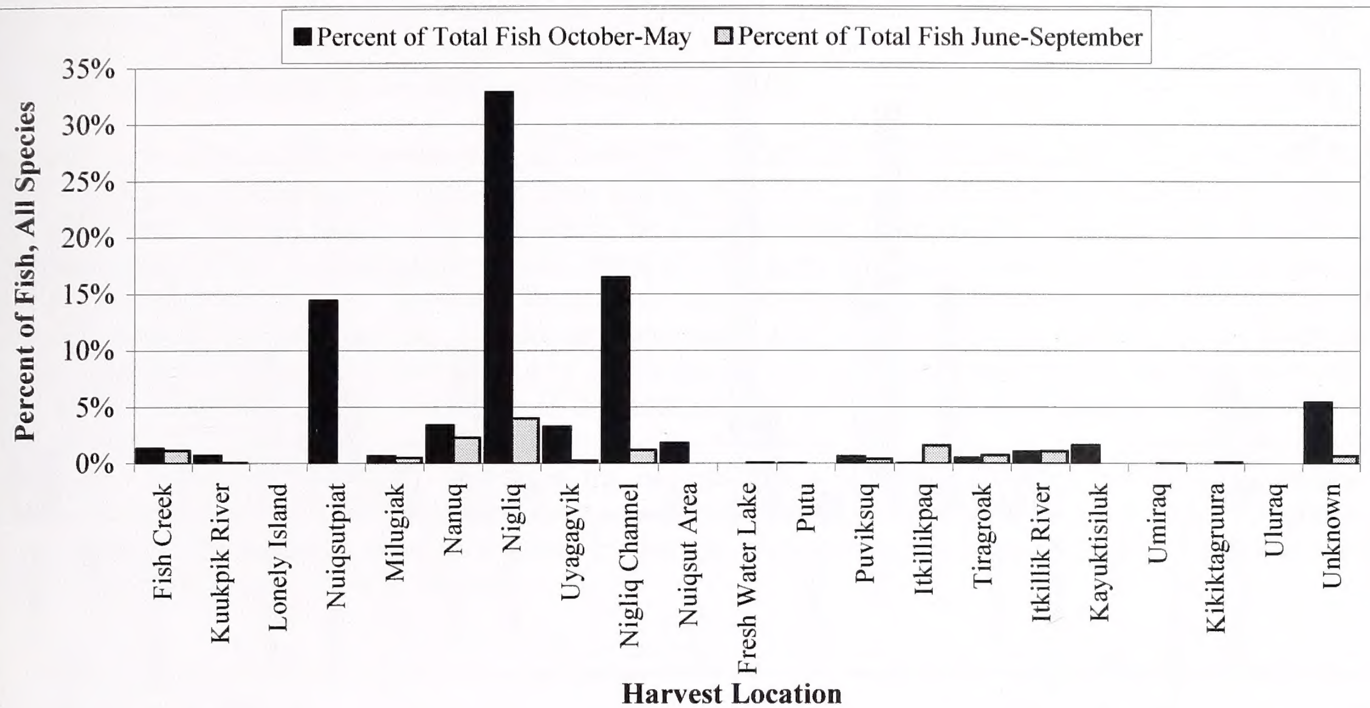



Note: This figure is based on raw, uncorrected data and does not represent total harvest numbers.
Source: NSB (2003; unpublished Nuiqsut harvest data 1994-1995, 2000, and 2001) and SRBA (2003b).

**Figure J-13. Nuiqsut Subsistence Fish Harvests by Month and Species, 1994-1995, 2000, and 2001.**

Key fishing areas, as measured by total harvest for all species, were around Nuiqsut and throughout the Colville River Delta, including Nigliq and the Nigliq Channel (Figure J-14). Because of their large numbers and annual variability, Arctic cisco harvests were removed from the analysis in order to better examine fish harvested in smaller proportions. Figure J-15 shows that the Colville River Delta, including the Nigliq Channel, Nuiqsut, and the Nigliq locality, remained an important Nuiqsut fish harvest location, even when excluding Arctic cisco. In

addition, Nanuq Lake, Fish Creek, and upriver locations, such as Itkillikpaat, Kayuktusilik, and Umiraq, were also important for the harvesting of fish other than Arctic cisco.

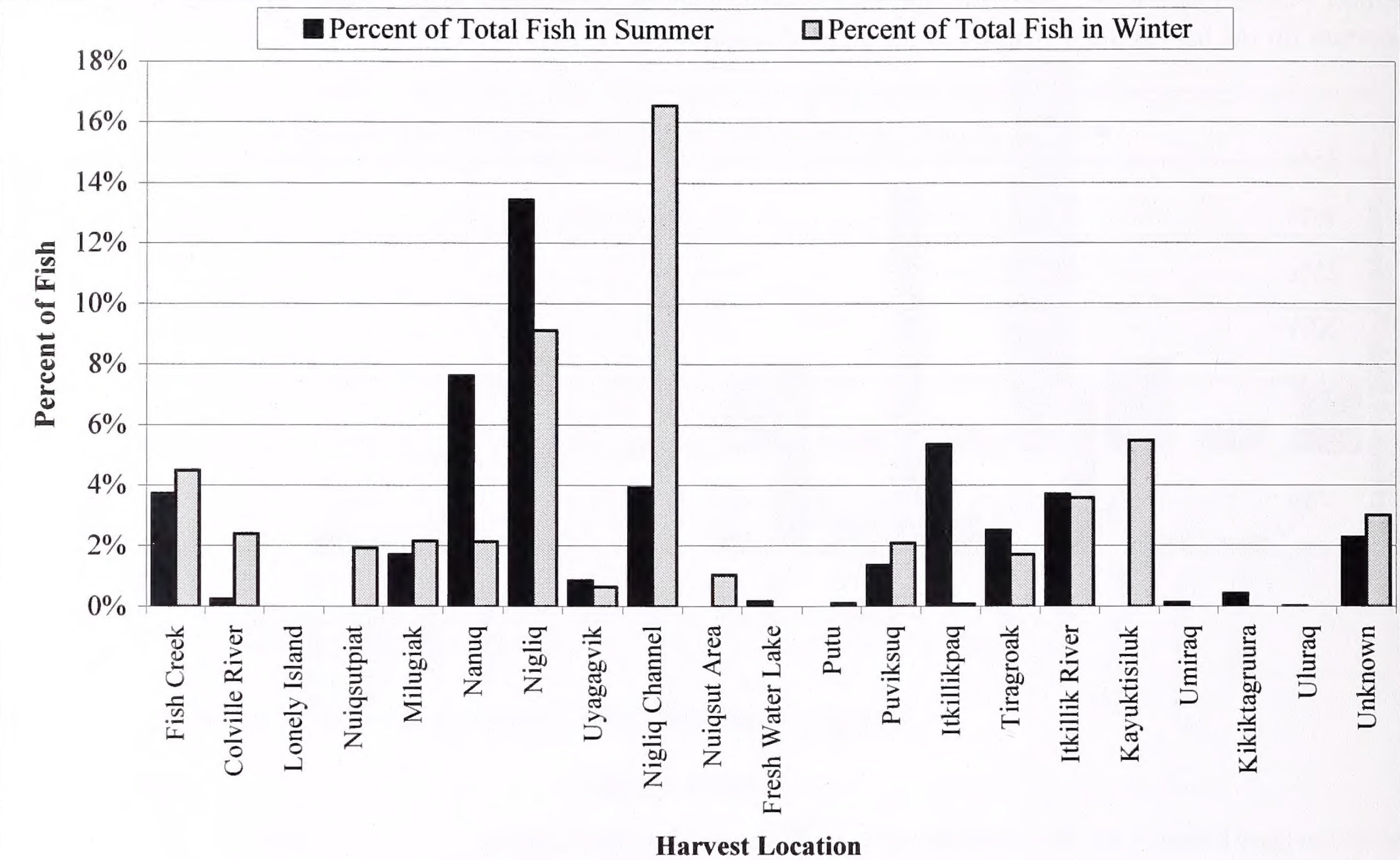



Note: This figure is based on raw, uncorrected data and does not represent total harvest numbers.
Source: NSB (2003; unpublished Nuiqsut harvest data 1994-1995, 2000, and 2001) and SRBA (2003b).

**Figure J-14. Nuiqsut Cumulative Subsistence Fish Harvest by Location, 1994-1995, 2000, and 2001.**

Resource users set nets in the Nigliq Channel for broad whitefish in mid-June and July, following the breakup of ice on the river; after breakup, the fishery is accessible on foot, by boat, truck, or all-terrain vehicle. Several interviewed resource users stated that "everybody in town goes down there if they can" (SRBA 2003b). In August and September, fishers set nets and angle in the Nigliq Channel, Nanuq Lake, Fish Creek, and the Colville River Delta, or travel by boat up the Colville River, up to and beyond Umiat, for grayling, chum salmon, silver salmon, and Arctic char. Some people fish in the nearshore waters, inside the barrier islands. Fishing in these areas may be done by Nuiqsut bowhead whaling crews while they are at Cross Island (Map J-10). In the fall and early winter, grayling gather at river mouths, and nets are set under the ice for other fish migrating out of the rivers, including whitefish and cisco. Jigging through the ice for burbot, grayling, and rainbow trout continues until the coldest months of winter (SRBA 2003b).

Fishing is an important family activity and an opportunity for multiple generations to gather at camps for cooperative fishing and other resource harvests. Elders from the area know the most productive fishing spots, which species are available at which locations, and the best times to fish for them. Angling and jigging are done by children, as well as elders, in all seasons, and species harvested by these methods are highly valued. For example, one Nuiqsut resident spoke of the high local value placed on burbot livers when he said, "We all eat that! We get them for the liver; it is rich and the meat is rich" (SRBA 2003b). In the summer, net fishing along the Nigliq Channel, and at cabins and camps on Fish Creek, are highly valued family activities, as Nuiqsut families cooperate for weeks at camp, catching and drying whitefish for later consumption and distribution. Family members with year-round wage jobs work in town, while other family members of all ages work at the camps. The wage workers return in the evenings or weekends to bring supplies, visit, and participate in subsistence activities (SRBA 2003b).




Note: This figure is based on raw, uncorrected data and does not represent total harvest numbers.
Source: NSB (2003; unpublished Nuiqsut harvest data 1994-1995, 2000, and 2001) and SRBA (2003b).

**Figure J-15. Nuiqsut Subsistence Fish Harvest (excluding Arctic Cisco) by Season and Location.**

### J.10.4.8 Waterfowl

The most important species of waterfowl for Nuiqsut hunters are the Canada goose, white-fronted goose, and brant; eiders are also harvested. Ruth Nukapigak relates that " ...when the white-fronted goose come, they do hunt them. When the thin ice near the mouth of the river breaks up, that is when they start duck hunting. We, the residents of Nuiqsut, go there to hunt for ducks when they arrive" (USDOI BLM 1998). Ptarmigan is the only upland bird hunted extensively (Brower and Hepa 1998, ADFG 2001). Recent data indicate that the subsistence bird harvest provided 5 percent of the total subsistence harvest (Brower and Hepa 1998). Waterfowl hunting occurs mostly in the spring, beginning in May, and continues throughout the summer. In the summer and early fall, waterfowl hunting usually occurs as an adjunct to other subsistence activities, such as checking fish nets.

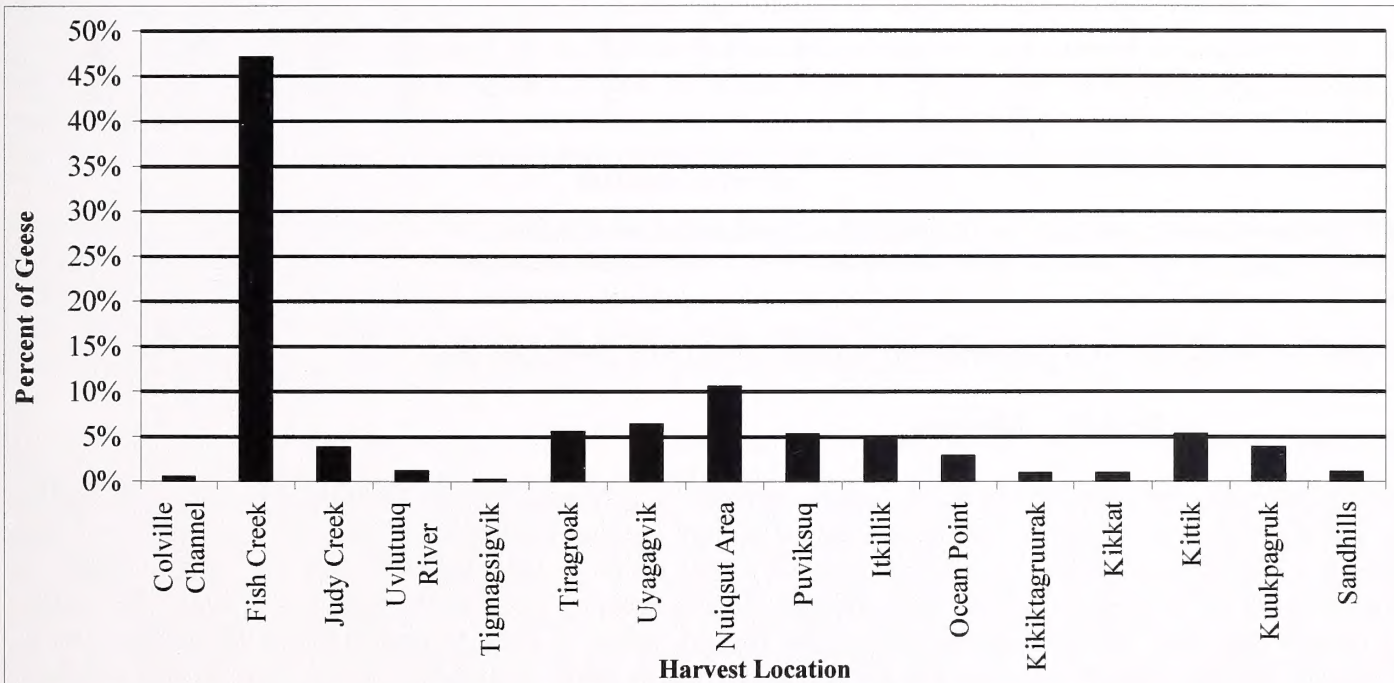
#### Waterfowl Use Areas

Waterfowl harvested by Nuiqsut hunters occupy two habitats in the greater Nuiqsut area. Ducks, geese, and brant molt and nest in the wet tundra to the north of Nuiqsut (Map J-9), while eiders nest and molt on the sandy areas of the Colville River Delta and the barrier islands (Map J-12). Both groups of waterfowl raise their young in the area until fall, when they migrate south. Nuiqsut hunters harvest waterfowl during the migration in May and June, using snowmachines and boats (Figure J-7). The hunters harvest the migrating birds from snow blinds built to the south, near Sentinel Hill and Ocean Point or at Fish Creek. Once the river breaks up, hunters look for birds by boat, and, as summer approaches, begin to look for eiders at the ice edge in the Colville River Delta and Harrison Bay. Hunters end the waterfowl harvest when the birds are nesting (SRBA 2003b).

In earlier times, Iñupiat resource users harvested flightless molted birds by cooperatively herding them into creeks, and dividing the harvest between the work group members. One resident remembered doing this cooperative

herding as recently as the late 1940s at Oliktok Point. In the past, Nuiqsut people gathered and stored eggs from waterfowl nests on the tundra. According to 2003 interviews, eggs are no longer gathered, and certain species of waterfowl are not harvested. Some residents indicated that they do not eat certain varieties of ducks (e.g. oldsquaws and pintails), while many choose to avoid harvesting black brant and spectacled eiders because they are endangered. Nearly all resource users harvested geese in May, and most harvested some eiders when ice breakup allows boat travel on the river and in Harrison Bay (SRBA 2003b).

The NSB collected waterfowl harvest data for 1994-1995, 2000, and 2001 (Brower and Hepa 1998, NSB 2003). Goose hunting areas included the Fish and Judy creeks area, the Colville River Delta, the area around Nuiqsut extending to the Fish and Judy creeks area, along the Colville River up to Sentinel Hill, the area around Ocean Point, and along the Itkillik River (Map J-9 and Figure J-16). Figure J-16 shows that 79 percent of geese, including white-fronted and Canada, were harvested in the Fish and Judy creeks area (63 percent) and the Colville River Delta (16 percent). Of the remaining 21 percent, most geese were harvested up the Colville River, from Ocean Point to Umiraq. The Fish Creek harvest was by far the largest reported for the study years, with nearly 48 percent of the harvest. The Colville River Delta area sites, which include the Nuiqsut area and Uyagagvik, were significant when aggregated. Reported harvest locations to the south, which were along the Colville and Itkillik rivers, constituted a small, yet significant portion of the harvest. These locations included, but were not limited to, Puviqsaq, Itkillik, Ocean Point, Kittik, and Kuukpagruk. Interviewed subsistence users in Nuiqsut related that the harvest sequence for migratory waterfowl proceeds from the south to the north, and that the first birds of the season are those harvested upriver (SRBA 2003b).

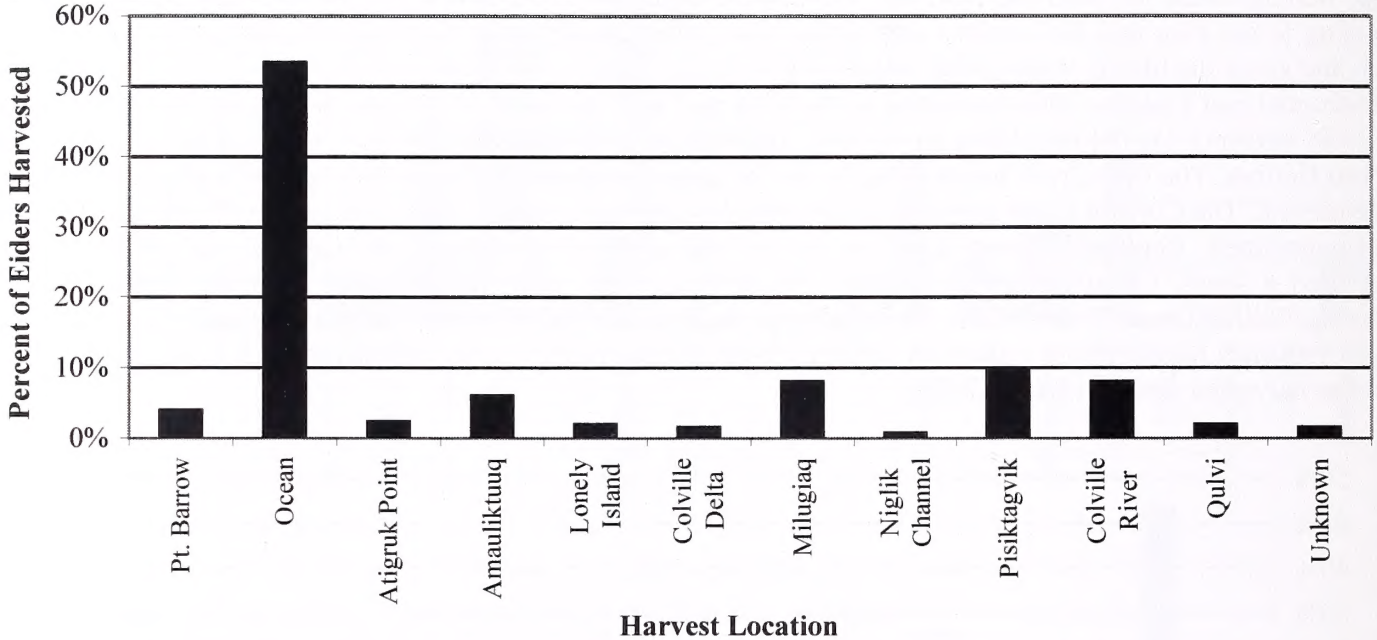


Source: NSB (2003; unpublished Nuiqsut harvest data 1994-1995, 2000, and 2001) and SRBA 2003b.

**Figure J-16. Nuiqsut Harvest Locations for All Species of Geese, 1994-1995, 2000, and 2001.**

Map J-12 shows the partial subsistence use areas for eiders, which reflects the more specialized habitat needs of eiders. Figure J-17 shows the cumulative harvest of eiders by location, based on NSB harvest data for 1994-1995, 2000, and 2001 (NSB 2003). More than half (53 percent) of all eiders were harvested in the ocean. Associated coastal and offshore harvest locations for eiders include Atigaru Point (Atigaruk), Thetis Island (Amauliqtuuq), and Lonely Island. The Colville River Delta and its channels and sites in the area, including Milugiaq, the Nigliq Channel, and Pisiktaviq, were the major freshwater harvest areas for eiders, accounting for 28 percent of the eider harvest.

Waterfowl, an important subsistence food, are the first fresh meat in the spring. Waterfowl are an important food for *Nalukataq* celebrations held by whaling captains in the early summer, and whaling crew members spend considerable effort in harvesting waterfowl. Waterfowl may be harvested by hunters walking down the Nigliq Channel after work or school, without having to invest in transportation. Waterfowl hunting trips also are sometimes the last overland trips made to cabins and camps on Fish and Judy creeks and along the Nigliq Channel before conditions make it impossible to use snowmachines for the season. The first boat trips of the year are taken to harvest seals and eiders at the Nigliq Channel mouth (SRBA 2003b).




Note: This figure is based on raw, uncorrected data and does not represent total harvest numbers.
Source: NSB (2003; unpublished Nuiqsut harvest data 1994-1995, 2000, and 2001) and SRBA (2003b).

**Figure J-17. Nuiqsut Harvest Locations for Eiders, 1994-1995, 2000, and 2001.**

### J.10.4.9 Moose

Moose are normally harvested by boat, in August, upriver from Nuiqsut on the Colville, Chandler, and Itkillik rivers, but the timing of harvest varies depending on current hunting regulations (Figure J-7). August 1 through September 14 is the current legal season for harvest. Local residents have indicated that the windy weather in September is not suitable for moose hunting, and fall whaling occupies much of the community during the month. Many hunters plan their work schedules around this harvest period in order to participate in the moose harvest. Hunting trips include extended families and friends, occupying as many as six boats, which travel to Fish and Judy creeks, up the Colville River to the general area of Umiat, or up the Itkillik River. Camps are set up, and cabins and caches are cleaned. As with other subsistence activities, moose hunting trips provide opportunities for other harvest activities, including caribou hunting, fishing, and berry picking. Evenings at camp are a time for visiting, telling stories, and teaching young people about subsistence practices (SRBA 2003b). In public testimony for the 1998 Northeast IAP/EIS in Nuiqsut, Nelson Ahvakana stated:

> The regulations state in 26(A), under Alaska Fish and Game, that the village residents would hunt moose in the month of August by boat only and then in September. But when September comes around, the people here usually don't hunt by boat because the winds are so severe that the river is not available to go hunting up in that area. They don't hunt if the river is shallow. They don't hunt by packing what they have all the way up to the mouth of the creeks up there (USDOI BLM 1998).

Harvest data show that moose have also been harvested during the winter months by snowmachine (Table J-6; Brower and Hepa 1998). In 1985, hunters reported a harvest of 13 moose (ADFG 2001). In 1993, 9 moose were reported harvested by surveyed subsistence households (Brower and Hepa 1998, ADFG 2001). A subsistence-harvest survey conducted by the NSB Department of Wildlife Management covering July 1994 to June 1995, reported 5 moose harvested, 5 percent of the total edible pounds harvested that season (Brower and Hepa 1998).

#### Moose Use Areas

As depicted in Map J-11, moose are hunted from the Colville River Delta area upstream to Ninuluk Creek, up the drainages of the Itkillik River and Fish and Judy creeks, and up some side streams off the Colville River. One hunter mentioned going almost to the Killik River confluence looking for moose, while several others reported Fish and Judy creeks, the Chandler and Anaktuvuk river confluences, several side streams and channels of the Colville River, and the Itkillik River area as prime moose hunting areas (SRBA 2003b). Although small numbers of moose are harvested, they are a valued component of the subsistence harvest in Nuiqsut, and hunters spend considerable effort in their pursuit. Moose offer a significant amount of meat per animal harvested because of their relatively large size compared to other terrestrial mammal subsistence resources.

### J.10.4.10 Furbearers

During the 2003 interviews, Nuiqsut hunters described three species of terrestrial furbearers as being especially important: wolf, wolverine, and fox (SRBA 2003b). Once there is adequate snow in the winter for snowmachine travel, usually by November, hunters earnestly begin the pursuit of wolf and wolverine. The harvest area for furbearers extends from the eastern edge of the Colville River Delta along the coast, almost to Admiralty Bay, and then south along the Ikpikpuk River to the Colville River, eastward to the Toolik River, north and crossing the Dalton Highway to Franklin Bluffs, and west and north back to the Colville River Delta (Map J-10). During interviews, the southern extent of the harvest area sometimes extended off of the map that was used.

Hunters travel in groups of one to three over this vast area looking for wolf and wolverine tracks and signs. When the hunters spot tracks, they follow them until the animal can be harvested. Foxes are sometimes trapped, but only a few of the hunters interviewed still set traps. Several hunters consider fox furs harvested inland to be of better quality than those on the coast. These hunters believe that coastal foxes, particularly the Arctic fox, get greasy while feeding on seal scraps left by polar bears, causing their fur to become stained (SRBA 2003b).

Wolverine harvest locations reported for 1994-1995, 2000, and 2001, as shown in Figure J-18, indicate that a third of the harvests took place in or near Nuiqsut, 18 percent at unknown locations, and 33 percent near areas south of Nuiqsut, along the Colville River from Ocean Point to Umirak. Similarly, 27 percent of wolves harvested during these years were harvested in the Kuparuk (*Kuukpaagruk*) area, with 29 percent harvested in the area of Fish and Judy creeks, Harrison Bay, and Tingmiaqsigvik. A number of upriver sites accounted for the balance of the wolf harvest, including Kikiktagruurak (14 percent), Kittik (9 percent), Ahaliurak (5 percent), and Ocean Point (5 percent). One hunter, explaining where wolves and wolverines could be found, said, "Wolf, wolverine, and caribou go to the lowest levels, which have the best hiding spots. These are rivers, bluff bases, creeks, frozen ground, and low level places that allow them to hide" (SRBA 2003b).

The relatively small number of wolves and wolverines harvested is not representative of their importance to the community. The pursuit of furbearers is friendly and competitive, both within and between villages, and has an important function in teaching young hunters, primarily males, the landmarks and resources of a very large area. Occasionally, furbearer hunters will encounter hunters from other villages on the tundra, which fosters connections between villages; this connection takes place mostly in a male social context. Wolf and wolverine fur continues to be an important and highly valued component in Iñupiat clothing. There is an economic interest in fur hunting, despite the relatively poor commercial market for fur; one fur hunter stated that he received $450 for a good wolverine pelt and $600 for a wolf pelt. This money allowed him to pay for enough gas for a snowmachine trip to Barrow (SRBA 2003b).

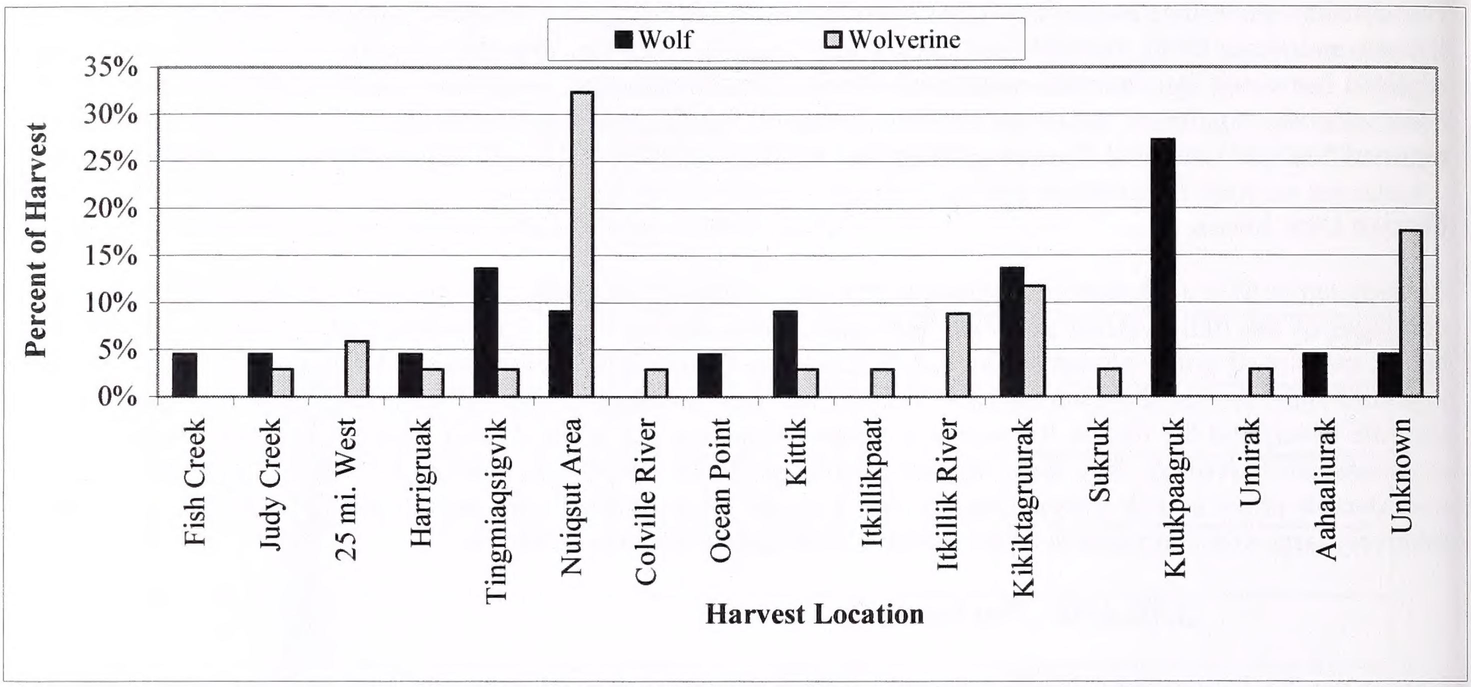



**Figure J-18. Nuiqsut Subsistence Wolf and Wolverine Harvests by Location, 1994-1995, 2000, and 2001.**

#### J.10.4.11 Berries and Plants

As shown in Map J-12, berries and plants are a widely dispersed resource, but are available for a very short time. Depending on the variety, they are available along the raised banks of streams and rivers and in wet tundra areas. Berries of numerous varieties are harvested in the Fish and Judy creeks area, and along the Colville, Chandler, Anaktuvuk, and Itkillik rivers. Plants such as Eskimo potato, medicinal plants, and greens are harvested at the same time, usually when families are out at camp hunting and fishing in the late summer. Berry picking is still considered a job primarily for women and children, although many men mentioned picking berries as well. Berry varieties include salmonberries and blueberries. Berries are primarily harvested in August, when many families are out moose hunting up the creeks and rivers of the area. People will often pick buckets or large freezer bags full of berries, which are then taken home and stored in ice cellars or freezers for later use in Eskimo ice cream made from whipped seal, or other fat, sugar, plants, and berries.

### J.10.5 Subsistence Expenditures

Figures J-19 and J-20 indicate recent survey results regarding Nuiqsut household consumption of subsistence foods and expenditures on subsistence activities. At the Nuiqsut 1998 Northeast IAP/EIS public hearing, Thomas Napageak considered the household expenditures for subsistence activities indicated in Figure J-19 to be too low. He reported that: “A snowmobile alone costs about that much [$10,000]. An Evinrude $12,000. Those are what we use to hunt. They think that we don’t spend a lot of money to subsist here. We no longer use oars to do our hunting when we are in our boats. We use Evinrude outboard motors...” (USDOI BLM 1998). Some residents purchase equipment and loan it to friends and relatives who have more time to hunt, in return for a share of the harvest (SRBA 2003b). A gill net suitable for fishing in the Colville River cost from $130 to $185 in 2003, outboard motors of appropriate size cost $4,000 to $16,000, and a new, fully equipped outboard boat (with motors, fuel tank, cover, and trailer), suitable for river and maritime use, can cost almost $40,000 dollars.

Nuiqsut residents, responding to a NSB 1998-1999 household census, indicated that 17 households (27 percent of respondents) spent from $1 to $1,000 on subsistence activities, 24 households (38 percent of respondents) spent between $1,001 and $6,000 per year on subsistence activities, and 16 households (25 percent of respondents) spent more than $6,001 (Figure J-19). Eight Nuiqsut residents reported spending more than $10,000 on subsistence activities. Nuiqsut residents were also asked what amount of subsistence foods they ate daily; of the 44

respondents, 75 percent indicated that subsistence foods made up half or more of their daily food intake (Figure J-20). Only 6 respondents (14 percent) indicated little or no use of subsistence foods.

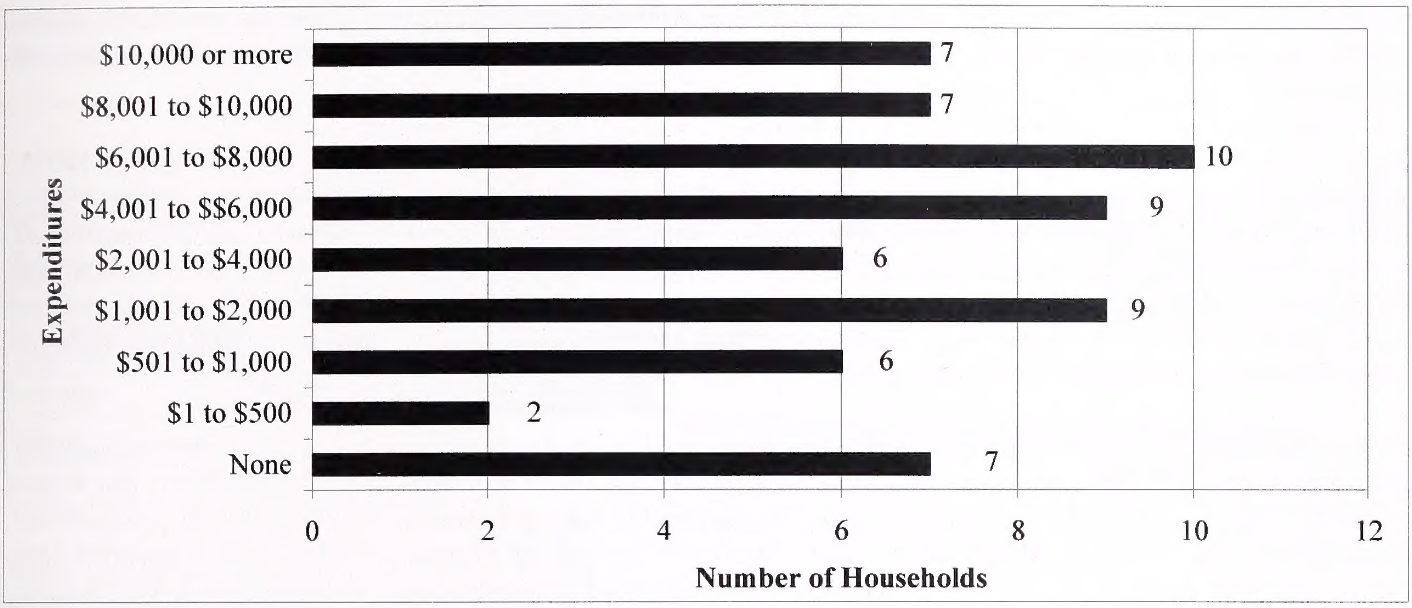



**Figure J-19. Nuiqsut Expenditures on Subsistence Activities, 1998-1999.**

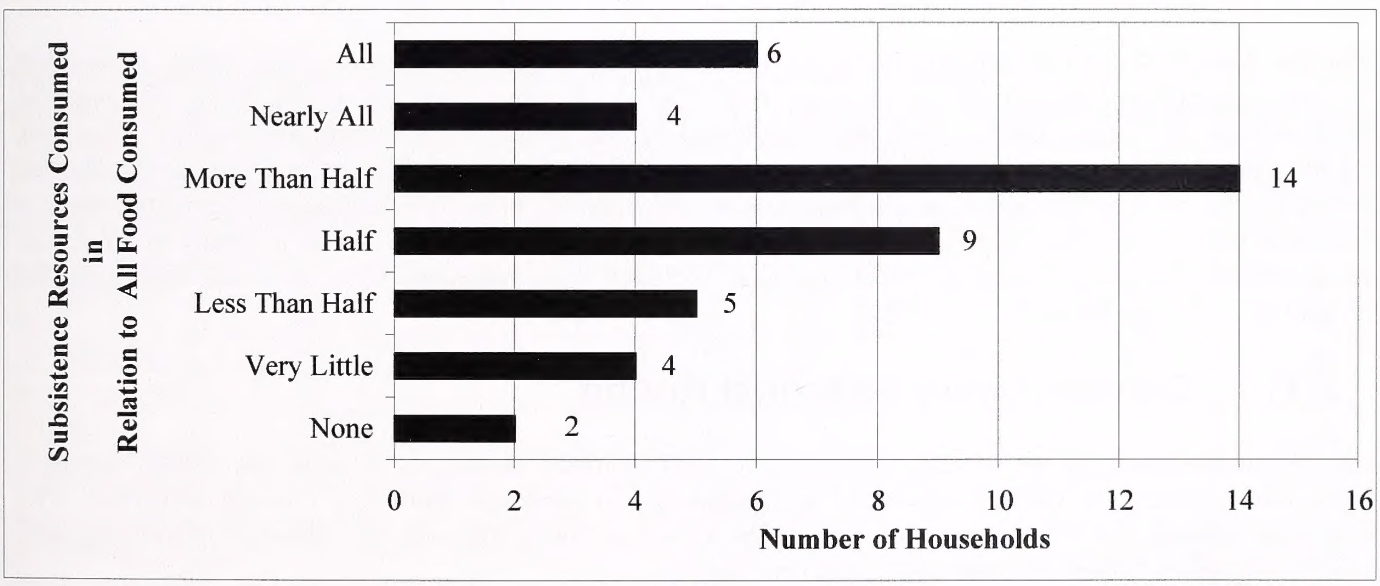



**Figure J-20. Nuiqsut Household Consumption of Subsistence Foods in Relation to All Food Consumed, 1998-1999.**

# J.11 Anaktuvuk Pass

This section is reproduced from the *Alpine Satellite Development Plan EIS* (USDOI BLM 2004), one of the few documents to address North Slope oil development impacts on the community of Anaktuvuk Pass. Anaktuvuk Pass is just south of the continental divide, in a low pass connecting the drainages of the Anaktuvuk and John rivers, 60 miles west of the Dalton Highway. The area has been used by the interior Iñupiat people, called the Nunamiut, for at least 500 years, and by Iñupiat predecessor groups for at least 4,000 years. The modern village began in 1949, with the establishment of a trading post, followed by a post office in 1951, and a church in 1958. Residents incorporated as a fourth-class city in 1959. A permanent school was established in 1961, and the community was reclassified as a second-class city in 1971 (Hall et al. 1985).

The Nunamiut people are among the few in the NSB without direct access to marine mammals. As a consequence, the Iñupiat of this village rely heavily on terrestrial mammals and fish for subsistence. Caribou is the main terrestrial mammal resource, with moose and Dall sheep also important resources for hunters. Freshwater fish from area lakes and streams are an important supplement to terrestrial mammals. Terrestrial resources are often bartered for marine resources with other communities, particularly Nuiqsut and Barrow (Brower and Opie 1996, Fuller and George 1999).

Hall et al. (1985) divided the history of the people of Anaktuvuk Pass into seven periods: prehistoric (before 1860), protohistoric (1860-1890), pre-removal historic (1890-1920), coastal hiatus (1920-1934), return (1934-1949), settlement (1949-1960), and mechanization (1960-1984). This structuring of events revolves around the arrival of Euro-Americans, the historic depopulation of the Brooks Range and interior in response to environmental and historical events, and the resettlement of those areas. Euro-American contact beginning in the 19th century, and the cyclical nature of the environment (e.g., fluctuations in caribou herds), worked together to change Nunamiut lifeways from the protohistoric through the coastal hiatus periods.

A caribou population crash and the advent of commercial whaling in the latter half of the 19th century; sustained contact with Euro-Americans; the introduction of new technology (such as rifles), trade goods (flour, tea, sugar, and coffee), and diseases; and the integration of Iñupiat people into the world economic system (commercial whaling and later fur trapping), all had effects on the Nunamiut. As a result of these changes, many Nunamiut were drawn to the coast through the Colville River area. They dispersed along the coast to participate in commercial whaling and fur trapping, and to access the greater abundance and diversity of subsistence and imported resources in the coastal areas. Others moved towards Fort Yukon and the Mackenzie River area, where the Porcupine Caribou Herd was more numerous than the WAH caribou (Hall et al. 1985).

Following the decline of commercial whaling by 1910, falling fur prices in the 1930s, and the steady rebound in WAH caribou populations, Iñupiat people returned to the Brooks Range in the late 1930s. Many followed the Colville River back to Anaktuvuk Pass, a location preferred by Nunamiut people for its ready access to caribou, moose, Dall sheep, and fish. A trading post and a school were built in Anaktuvuk Pass, which became the nucleus of a community that drew in Nunamiut people from several communities in the Brooks Range. The maintenance of the subsistence way of life from a sedentary village was partially facilitated by the use of a variety of all-terrain vehicles to replace pack dogs. These all-terrain vehicles included snowmachines, four-, six-, and eight-wheeled vehicles, and tracked vehicles (Hall et al. 1985).

## J.11.1 Contemporary Seasonal Round

Seasonal subsistence activities are summarized in Figure J-21. Caribou hunting is the mainstay of the Nunamiut subsistence hunt; caribou are hunted year-round as needed, but in particular from July through November. The caribou migrate through the Anaktuvuk Pass area twice a year, in the spring and fall, although the number and timing of the migration through the area vary from year to year.

The 1994-1995 harvest year was one such anomalous year, when the migrations were small and the summer availability was high—a time when the caribou are normally out on the coastal plain for insect relief (Brower and Opie 1996). Dall sheep (the main target), brown bear, and moose are hunted in August, September, and October some distance from the village. Birds and fish are supplementary to terrestrial mammals, but are harvested when available and are more important if caribou numbers are low. Berries are seasonally important, with salmonberries and blueberries providing the majority of vegetable foods.

## J.11.2 Subsistence Harvests

As mentioned above, Anaktuvuk Pass is unlike the other NSB communities in that resource users have no direct access to the marine mammal resource that in many ways defines the Iñupiat of the coast. Tables J-7 and J-8 show the importance of terrestrial mammals, with nearly three-fourths of the community participating in the harvest, which comprised 88 to 95 percent of the harvest. Caribou are the main terrestrial mammal species harvested, with

moose and sheep also harvested in small numbers. Fish are a smaller component of the subsistence diet by weight, but are still an important food source. Fish species harvested include grayling, Arctic char, lake trout, burbot, and pike. Birds harvested during the brief migration include a variety of geese and ducks. Preferred species are white-fronted and Canada geese and several species of small ducks, such as pintail. Vegetation harvested includes berries and Eskimo potatoes (SRBA 2003b).

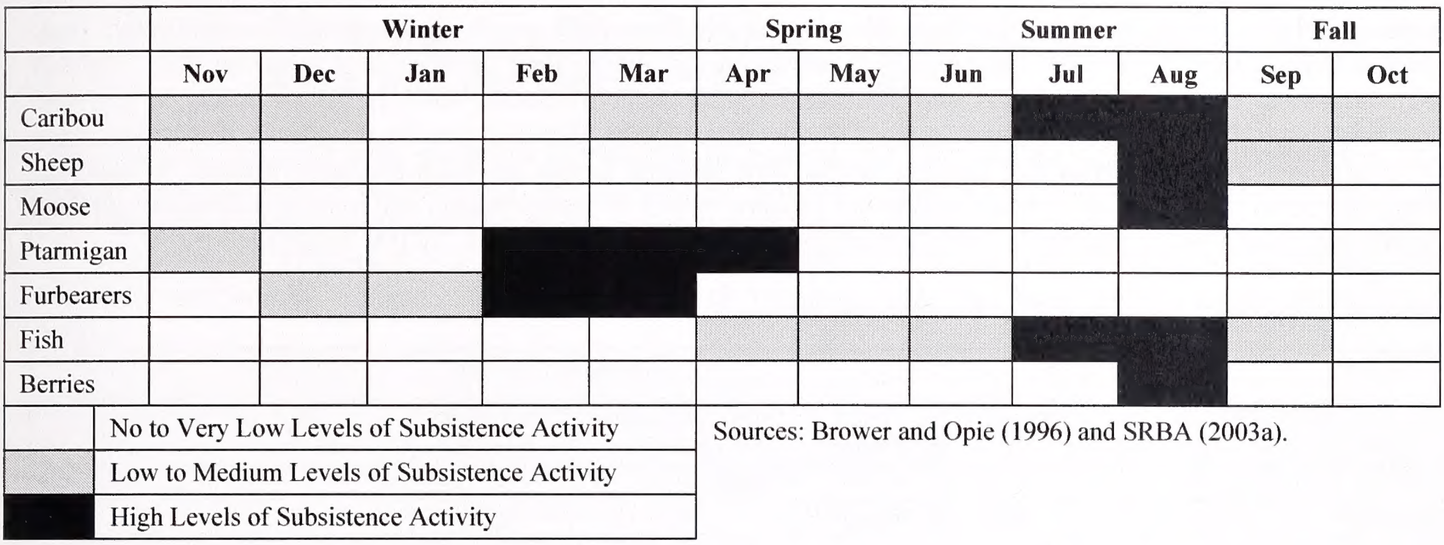



**Figure J-21. Annual Cycle of Subsistence Activities – Anaktuvuk Pass.**

**Table J-7. Anaktuvuk Pass Subsistence Harvests and Subsistence Activities.**

| Resource | Percentage of Households | | | | | Estimated Harvest | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Use | Try to Harvest | Harvest | Receive | Give | Number | Total Pounds | Mean Household Pounds | Per Capita Pounds | % Total Harvest |
| **1992** | | | | | | | | | | |
| All resources | | | | | | | 85,040 | 1,076 | 315 | 100 |
| Fish | | 67 | | | | 4,892 | 6,897 | 87 | 26 | 8 |
| Land mammals | | 74 | | | | 771 | 74,412 | 942 | 276 | 88 |
| Marine mammals | | 1 | | | | 0 | 0 | 0 | 0 | 0 |
| Birds/eggs | | 21 | | | | 733 | 913 | 12 | 3 | 1 |
| Vegetation | | 68 | | | | 607 | 2,818 | 36 | 10 | 3 |
| **1994-1995** | | | | | | | | | | |
| All resources | | 62 | 61 | | 75 | | | | | 100 |
| Fish | | | | | | 1,282 | | | | 4 |
| Land mammals | | | | | | 424 | | | | 95 |
| Marine mammals | | | | | | 0 | | | | 0 |
| Birds/eggs | | | | | | 196 | | | | >1 |
| Vegetation | | | | | | 21 | | | | >1 |

Sources: Brower and Opie (1996), Fuller and George (1999), and SRBA (2003a).

## J.11.3 Subsistence Use Areas

Anaktuvuk Pass hunters rely heavily on terrestrial mammals, and to a lesser extent, on fish. One of the important factors contributing to the resettlement of the area was the seasonal migration of caribou through the Pass. Detailed and exhaustive mapping of lifetime subsistence use areas for the community were presented in the 1985 report produced by Hall et al. for the NSB, but these are beyond the scope of this document. Map J-14 is a partial

subsistence use area map for the last 10 years based on interviews conducted in 2003 for the *Alpine Satellite Development Plan EIS* (SRBA 2003a, b).

A formerly used harvest strategy was herding small groups of migrating caribou into lakes, streams, or valleys to limit their mobility, and then harvesting and processing the caribou in a cooperative group undertaking (Spearman 1979). While waiting for the caribou to be herded through these areas, members of the group would fish in the streams and lakes. Many residents recalled this way of life from their youth in the smaller communities (e.g. Chandler Lake, Killik River, and Tulugaq Lake), which in the 1950s came together in Anaktuvuk Pass (Rausch 1951). Nunamiut hunters bartered furs and dried caribou for other resources, such as marine mammal fats and hides, with coastal people at trade fairs in the Colville River Delta, Barrow, and Barter Island. Anaktuvuk Pass people currently trade resources and hunting access with Nuiqsut people in much the same manner as they did during traditional times; however, hunters now use modern means of transportation and hunt on a compressed time schedule (Spearman 1979; Hall et al. 1985; Ahtuangaruak *in* USDOI MMS 2001; SRBA 2003b).

**Table J-8: Selected Anaktuvuk Pass Subsistence Harvests.**

| Resource | Estimated Harvest | | | | |
|---|---|---|---|---|---|
| | Number | Total Pounds | Mean Household Pounds | Per Capita Pounds | % Total Harvest |
| **1990** | | | | | |
| Caribou | 592 | 69,964 | 985 | 223 | |
| **1991** | | | | | |
| Caribou | 545 | 66,712 | 940 | 245 | |
| **1992** | | | | | |
| Caribou | 600 | 70,222 | 889 | 260 | 83 |
| Dall sheep | 32 | 3,168 | 40 | 12 | 4 |
| Grayling | 3,709 | 2,967 | 38 | 11 | 4 |
| Lake trout | 531 | 2,124 | 27 | 8 | 3 |
| Arctic char | 640 | 1,791 | 23 | 7 | 2 |
| **1993** | | | | | |
| Caribou | 574 | 67,713 | 846 | 219 | |
| **1994-1995** | | | | | |
| Caribou | 322 | | | | 83 |
| Dall sheep | 27 | | | | 13 |
| Grayling | 931 | | | | 1 |
| Lake trout | 80 | | | | 1 |
| Arctic char | 215 | | | | 1 |
| Sources: Brower and Opie (1996), Fuller and George (1999), ADFG (2001), and SRBA (2003a). | | | | | |

Harvest areas identified in the most recent data from the NSB are primarily within approximately 20 miles of Anaktuvuk Pass, with most trips taken in the immediate vicinity of the community (Brower and Opie 1996). Lifetime subsistence use areas, as depicted in Hall et al. (1985), encompass the entire NSB from Aklavik, Canada, to Kivalina and Kotzebue Sound, and north to Point Barrow and Wainwright. Anaktuvuk Pass residents also traveled to Fort Yukon, Bettles, Wiseman, and Old Crow while trapping or working at seasonal jobs (Paneak 1990, Brower and Opie 1996). Travel corridors and trapping areas included the Sagavanirktok, Killik, Kobuk, Itkillik, John, and Colville rivers, and the coast between the Colville River Delta and Demarcation Point (Hall et al. 1985).

In August 2003, SRBA interviewed 12 subsistence harvesters in Anaktuvuk Pass for the *Alpine Satellite Development Plan EIS*. One purpose of these interviews was to learn if Anaktuvuk Pass residents used the Colville River Delta area for subsistence activities. The City of Anaktuvuk Pass identified knowledgeable Anaktuvuk Pass subsistence users for these interviews. Resource users interviewed in Anaktuvuk Pass used the valleys and slopes of the Brooks Range Mountains between the Killik River valley and Itkillik Lake, with some resource users having gone farther east and west on occasion. Most resource users did not go farther south than the Alatna, Hunt Fork, and North Fork rivers, although some had made trips to Bettles in the past. North of the Brooks Range, resource

users traveled by snowmachine and all-terrain vehicle along the front slope of the mountains, east to Itkillik Lake, west to Chandler River, north to Rooftop Ridge, and parallel the Colville River past Umiat to the Chandler and Killik rivers, then heading back south into the mountains. Periodic trips to Nuiqsut were made along the east or west side of the Anaktuvuk River, almost to its confluence with the Colville River, then heading east towards the Kuparuk hills, and north to Nuiqsut along the cat trail that roughly parallels the Itkillik River (Map J-14).

### J.11.4 Contemporary Connections to Nuiqsut, the Colville River Area, and the Beaufort Sea Coast

Anaktuvuk Pass residents have numerous connections to Nuiqsut, the Colville River area, and the Beaufort Sea. These connections include relatives who live in Nuiqsut; persons, or persons with relatives, who were born and raised along the Colville River and now reside in Anaktuvuk Pass; hunting for caribou in the Nuiqsut area during times of scarcity at Anaktuvuk Pass; hunting for wolf and wolverine during trips to Nuiqsut; and trading and exchanging with coastal residents and attending funerals (Rausch 1951; Hall et al. 1985; Paneak 1990; SRBA 2003b).

Many residents have relatives and friends residing in Nuiqsut, Kaktovik, and Barrow, as well as other North Slope communities. Some Anaktuvuk Pass residents moved into the community at different ages and maintained connections to the communities they came from, including Fort Yukon, Shungnak, Barrow, and Fairbanks (SRBA 2003b). Others grew up, or had relatives who grew up, along the Colville River and the Beaufort Sea coast and moved to Anaktuvuk Pass after the community was established. Two lifetime Anaktuvuk Pass residents described their several trips to Nuiqsut in the 1970s, stating that they mostly went to Nuiqsut for funerals. One resident stated, "Our fathers grew up in the flat country, we didn't, but our fathers did. They could travel anytime, even at night and never get lost. We never grew up in the flats; we are mountain men" (SRBA 2003b). The late Simon Paneak, of Anaktuvuk Pass, was noted for having traveled widely, as he had guided several wide-ranging explorations of the region, including the National Petroleum Reserve – Alaska (Ebbley and Joesting 1943, Paneak 1990).

Coastal residents trade food, furs, and other goods with Anaktuvuk Pass residents in exchange for dry meat and other Nunamiut specialties. Some Anaktuvuk Pass residents receive marine mammal products from friends and relatives in coastal communities (SRBA 2003b). Anaktuvuk Pass ties to the coast were particularly evident with one harvester who was born in Barrow and had lived the last 30 years in Anaktuvuk Pass. This person said, "I eat both foods: coastal (seal oil, seal, walrus, white fish) and Nunamiut/inland food (caribou, moose, freshwater fish [grayling, char, lake trout, ling cod], edible plants, and berries)."

Periodic shortages of caribou and other game have made living inland a difficult proposition for Iñupiat people for centuries, and required them to follow the migrating caribou herds year-round. In the late 1940s, the Nunamiut settled into Anaktuvuk Pass from Chandler Lake, Killik River, and Tuluġaq Lake, partially in response to the requirement for children to attend school. A result of sedentary life was the increased difficulty resource users experienced in harvesting adequate amounts of subsistence foods, even with modern transportation and other equipment. An added, and more recent complication, was the establishment of the Gates of the Arctic National Park and Preserve, which has restricted the use of certain all-terrain vehicles (such as Argos and four-wheelers) at snow-free times of the year. This has restricted Nunamiut from accessing subsistence areas, which they formerly occupied and used, during snow-free months (Hall et al. 1985;, SRBA 2003b).

Several times in the 1970s and 1980s, and as recently as 1994 and 1998, Anaktuvuk Pass residents found it necessary to travel great distances to procure enough caribou to feed their community. The NSB has paid for some trips, using charters and float planes to fly hunters from Anaktuvuk Pass to places like Umiat and Schrader Lake (located approximately 60 miles southwest of Kaktovik; SRBA 2003b). More recently, hunters have traveled to Nuiqsut to harvest caribou (Map J-14), and on other occasions Nuiqsut hunters have provided caribou, fish, and other coastal foods during lean times to the residents of Anaktuvuk Pass. The Nunamiut resource users reciprocated with gifts of dry meat and other specialties.

A lifetime Anaktuvuk Pass hunter, describing his winter trail to Nuiqsut, indicated he traveled in February or March, hunting as he traveled. This hunter stated that he generally stayed on the trail, using his binoculars to look out to the sides of the trail for game. He went to Nuiqsut once or twice a year, but did not do any fishing on the way to Nuiqsut, just wolf and wolverine hunting. He stated that his trips had a dual purpose, to hunt and to visit relatives in Nuiqsut, and that he generally stayed in Nuiqsut less than a week. He put 6,000 miles on his snowmachine in 6 months (SRBA 2003b).

Another Anaktuvuk Pass hunter harvested 15 to 20 caribou on a trip to Nuiqsut in 1998. He indicated that he harvested considerable caribou each year and said, “I hunt mostly in the winter time; it is easier. That is when the caribou are pretty fat. I hunt mostly in winter when there is snow on the ground; you can go further. The summer time you cannot go too much unless you have a good Argo. My dad has one.” He said that he received marine mammals from Nuiqsut and Barrow when they sent them up. He stated, “Also from Wainwright when they catch a whale; they send some in a box” (SRBA 2003b).

There is friendly competition between hunters and communities in the pursuit of wolf, wolverine, and fox. Several Anaktuvuk Pass hunters have traveled north to Nuiqsut, and hunted wolf, wolverine, and caribou en route. One hunter said, “I hunted everything on my trip to Nuiqsut,” and described the trip to Nuiqsut as “one camp” away. In other words, he left Anaktuvuk Pass, made camp for one night, and went to Nuiqsut the next day. Other hunters remarked similarly on the route, noting important landmarks and features along the way. One hunter had harvested wolf and wolverine near Ocean Point in 1998. While residents of several communities encountered each other while hunting furbearers, it was often noted that “it is better for them to see your tracks than for you to see theirs,” as often the tracks of other hunters was a sign that the animal being sought had already been taken or run off by the other hunter (SRBA 2003b).

In summary, Anaktuvuk Pass residents have hunted caribou, wolf, and wolverine along their winter travel routes north from near the confluence of the Anaktuvuk and Colville rivers all the way to Nuiqsut (Map J-14). In summer, Anaktuvuk Pass residents have hunted for caribou along the Colville River, past Ocean Point, and down the Nigliq Channel to the Beaufort Sea. They have also hunted summer caribou down the main channel of the Colville River to Anajuk Point, and fished in the main channel of the Colville River near Itkillikpaat.

## J.12 Other Villages

Other communities within or adjacent to the National Petroleum Reserve – Alaska are the Chukchi Sea communities of Point Lay and Wainwright. Subsistence harvest areas for these communities are not within or adjacent to the Planning Area, although recent research indicates that movement by the TLH caribou does bring the herd into the traditional subsistence harvest areas of the communities of Wainwright and Point Lay. Outside the North Slope, black brant that molt in the National Petroleum Reserve – Alaska have a substantial value to subsistence users in the Y-K Delta, and Canada geese are used extensively by subsistence hunters in Alaska’s Interior region.

Although subsistence users in many areas south of the Brooks Range utilize migratory waterfowl, by far the most important use is by Y-K Delta subsistence hunters. The Yup’ik Eskimo of the Y-K Delta region sustain themselves by harvests of their subsistence mainstays of salmon and other fish, and seals. However, waterfowl and other birds are important seasonal foods as well, particularly in the spring when their migrations bring them back to the Y-K Delta region. The Y-K Delta, one of the most productive areas for geese worldwide, is home to all of the world’s cackling Canada geese (65,000), nearly all of the emperor geese (59,000), about 80 percent of the world’s Pacific black brant, and 107,000 white-fronted geese. In addition, almost 75 percent of Alaska’s population of sandhill cranes breeds on the Delta (USDOI USFWS 1999a, b).

An estimated annual average of 97,000 birds was taken for subsistence use on the Y-K Delta between 1985 and 1995. Six goose subspecies are taken in this area: Pacific white-fronted goose, lesser Canada goose, cackling Canada goose, emperor goose, black brant, and lesser snow goose. Tundra swans and sandhill cranes are important species taken, and the principal duck species are pintail, mallard, and scoters. Other duck species taken are scaup,

oldsquaw, and king and spectacled eiders. Eighty-one percent of all birds harvested are taken before September 1 (Wentworth and Seim 1996). Of the total harvest on the Y-K Delta in this period, 26,000 (27 percent) were geese, 44,000 (46 percent) were ducks, 16,000 (16 percent) were ptarmigan, 6,000 (6 percent) were swans, 3,000 (3 percent) were cranes and 2,000 (2 percent) were other birds (primarily loons, murres, shorebirds, and gulls). This represented an average of 33 birds harvested for every household on the Y-K Delta. Converted to usable weights, the subsistence harvest of birds provided an average of 280,000 pounds of food annually to Y-K Delta residents between 1985 and 1995, or about 95 pounds of food per Y-K Delta household.

Large numbers of waterfowl breed, molt, and stage within or adjacent to the Planning Area. Because most of these species migrate along the Pacific and Mid-Continent flyways and other major corridors to distant localities where they spend most of the year, their conservation and management is of interest to subsistence hunters on the Y-K Delta.

## J.13 Subsistence Access Routes

As part of a study analyzing travel in North Alaska in 1974, a map describing historic travel routes was produced; this map was included in the 1998 Northeast IAP/EIS (USDOI BLM and MMS 1998). In the often featureless plain that characterizes much of the Planning Area during winter, topographic features such as river valleys, shorelines, large lakes, and the Beaufort Sea coastline, as well as geological formations such as pingoes, are crucial to the Iñupiat in determining safe routes to subsistence hunting sites. During periods of extreme weather, river valleys and shore banks offer some measure of protection for hunters, and there are often subsistence camps and cabins in these areas. If the weather is not too extreme and the river valley is sufficiently well defined, a traveler can continue the journey to the hunting site. During good weather, Iñupiat hunters can navigate using familiar features, such as meandering river bends, and transit between river drainages in the pursuit of game. Although fluvial features may define spring and summer movement corridors, they should be considered as points from which general cross-country movement sometimes occurs.

The Colville River valley and adjacent coastal lowlands comprise a traditional Iñupiat harvest zone that was actively inhabited until the 1940s. The Colville River historically was used by the coastal Iñupiat as a link to the Interior (Map J-15). Beyond its function as an interregional link, the Colville River and its tributaries provide the people of Nuiqsut with an area rich in hunting, fishing, and trapping opportunities. Moose are hunted along the length of the river, while summer fishing occurs in the Colville River Delta. Anaktuvuk Pass hunters travel down the Anaktuvuk River to the Colville and Itkillik rivers for moose and caribou, and, on occasion, to travel to Nuiqsut.

Winter fishing occurs around the village and inland along Fish Creek. Caribou are taken throughout the range of Nuiqsut's coastal subsistence harvest area and also along the southern reaches of the Itkillik River. The principal watercourses west of the Colville River that are use in the pursuit of subsistence resources are the Ublutuoch River and Judy and Fish creeks. To the east of the Colville River, hunters use the Miluveach and Itkillik rivers. Along the coastal plain, Nuiqsut hunters seem to favor hunting in the area between the community and Teshekpuk Lake. The lake is approximately 85 miles from Nuiqsut, and subsistence hunters often circumnavigate it before returning home.

While hunting near Teshekpuk Lake, Nuiqsut hunters often encounter hunters from Barrow, which has the largest subsistence hunting zone on the North Slope (Map J-1). From a review of Map J-15, it is believed that Barrow hunters use all of these routes and more. Atqasuk is used as a base camp for Barrow hunters as they hunt toward and into the foothills of the Brooks Range. The Meade, Topaguruk, and Ikpikpuk rivers are used for navigation into the Interior. The Ikpikpuk River route is particularly important, because it lies on the boundary of the Planning Area. Barrow hunters guide along the Beaufort Sea shoreline, using the smooth ice and the landfast-ice zone to reach Teshekpuk Lake. They often circumnavigate the lake and proceed to Nuiqsut to visit family members (Tremont 1987, 1997).

Atqasuk subsistence hunters primarily use the Meade, Inaru, Topaguruk, and Chipp river drainages for caribou hunting and for fishing, but the extent of their subsistence-harvest area extends farther west toward the Chukchi coast and east toward the Oumalik and Ikpikpuk rivers (Map J-6; USDOI BLM 1978; Schneider et al. 1980).

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# APPENDIX K

# INFORMATION, MODELS, AND ASSUMPTIONS USED TO ANALYZE THE EFFECTS OF OIL SPILLS

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# APPENDIX K

# INFORMATION, MODELS, AND ASSUMPTIONS USED TO ANALYZE THE EFFECTS OF OIL SPILLS

This Amended IAP/EIS analyzes oil spills, and their potential impacts to environmental, economic, and sociocultural resources and resource areas, which could result from onshore oil exploration and development in the Northeast National Petroleum Reserve – Alaska. Predicting an oil spill is an exercise in probability. There is uncertainty associated with the location, number, and size of oil spills, the chemistry of the oil, and the environmental conditions at the time of a spill. Although some of the uncertainty reflects incomplete or imperfect data, there is also a considerable amount of uncertainty involved in predicting events 15 to 25 years into the future. However, the chance of an oil spill occurring can be estimated using historical data.

Assumptions about oil spills are used to analyze the effects of oil spills. These assumptions pertain to the type of oil, the source of an oil spill, the general location and size of a spill, the chemistry of the oil, how the oil will weather, how long the oil will remain, and where the oil will go. Project-specific information, statistical analysis, and professional judgment support the assumptions. Based on these assumptions, a scenario is created to reflect a spill, and the effects of such a spill are analyzed. These steps constitute a "what if a spill occurs" analysis.

This oil spill analysis considers the entire production life of the Planning Area, and assumes that commercial quantities of hydrocarbons are present in the Planning Area and that these hydrocarbons will be developed and produced at the estimated resource levels presented in the Amended IAP/EIS. Uncertainties exist, such as 1) the actual resource levels, 2) the actual size of a crude or refined oil spill, 3) the approximate location of oil assumed to be produced, and 4) whether production would occur at all. If no hydrocarbons exist, there is no chance of a crude oil spill occurring in the Planning Area.

## K.1 Oil Spill Size Categories

This Amended IAP/EIS analyzes what is likely to happen in the future, using assumptions about the likely size, duration, and type of a spill to analyze the effects. To estimate these parameters, oil spills are divided into two types: crude oil and refined oil spills. Crude oil spills are divided into three size categories: small, large, and very large. Within each of these categories, generalized and specific assumptions are made. Refined spills fall into the small spill size category.

Small spills are defined as those less than 500 barrels (bbl; 1 bbl = 42 gallons); large spills are greater than or equal to 500 bbl or 1,000 bbl (depending upon the data source); and very large spills are greater than or equal to 120,000 bbl. Table K-1 shows the assumed source of a spill(s), type of oil, size of spill(s) in bbl, and the receiving environment that is assumed in the analysis of the effects of oil spills in this Amended IAP/EIS. The effects of spill(s) are analyzed in Chapter 4 (Environmental Consequences). The following sections discuss the oil spill analysis, and the assumptions used for analysis, for each of these three size categories.

### K.1.1 Probability of a Large Crude Oil Spill

Large spills are defined as greater than or equal to 500 bbl for the Alaska North Slope and Trans-Alaska Pipeline System (TAPS), and greater than or equal to 1,000 bbl for the TAPS tankers. Historical information about previous large spills on the Alaska North Slope, from TAPS, and from TAPS tankers was used to estimate the hypothetical size of large spills and the rate at which such large spills would be expected to occur in the future.

**Table K-1. Oil Spill Scenario Assumptions for the Alternatives.**

| Source of Spill | Type of Oil | Size of Spill (bbl) | Assumed Number of Spills Under Each Alternative | | | | Receiving Environment |
|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | |
| **Small Spills (< 500 bbl) Onshore and Offshore** | | | | | | | |
| Operational spills from all sources | Diesel or crude | 3 | 107 | 366 | 443 | 307 | Ice, tundra, snow, gravel pad, and water |
| | Refined | 0.7 | 264 | 904 | 1,095 | 760 | |
| **Large Spills (≥ 500 bbl) Onshore or Offshore** | | | | | | | |
| Pipeline | Crude | 500 | 0 | 1 | 2 | 1 | Ice, tundra, snow, gravel pad, and water |
| Platform/gravel pad | Crude | 900 | | | | | |
| Storage tank/gravel pad | Diesel | 900 | | | | | |
| **Very Large Spills (≥ 120,000 bbl)** | | | | | | | |
| Well blowout | Crude | 120,000 | Not Applicable | Not Applicable | Not Applicable | Not Applicable | Ice, tundra, snow, gravel pad, and water |

### K.1.1.1 Historical Large Crude Oil Spill Sizes

Assumptions for large spills from production in the Planning Area are based on the historic spill sizes from onshore Alaska North Slope oil industry spills from 1985 to 2000, TAPS spills from 1977 to 2001, and TAPS tanker spills from 1977 to 1999.

#### Historical Crude Oil Spills Greater Than or Equal to 500 Barrels on the North Slope

The Alaska North Slope oil spill analysis includes onshore oil and gas exploration and development spills from the Point Thompson Unit, Badami Unit, Kuparuk River Unit, Milne Point Unit, Prudhoe Bay West Operating Area, Prudhoe Bay East Operating Area, and offshore Duck Island Unit (Endicott). Alaska North Slope data include spills from onshore pipelines and offshore and onshore production and gathering facilities. The following information does not include spills on the Alaska North Slope from the TAPS, which were evaluated separately.

For the Alaska North Slope, all available information on historic spills greater than or equal to 100 bbl during the period 1968 through 2000 was obtained from industry and regulatory agencies and collated (Anderson and LaBelle 2000, Hart Crowser, Inc. 2000). The USDOI MMS and Hart Crowser, Inc. collected data for crude oil spills for the U.S. Beaufort Sea, the National Petroleum Reserve – Alaska, and Onshore Alaska North Slope east of the National Petroleum Reserve – Alaska from the following sources:

- British Petroleum (BP) Exploration (Alaska), Inc., electronic database files of oil spills in the Prudhoe Bay Unit Western Operating Area (1989 through 1996), Duck Island (Endicott) Unit (1989 through 1996), and Milne Point (1994 through 1996).
- BP Exploration (Alaska), Inc., electronic spreadsheet containing all industry and contractor oil spills from January 1997 to May 2001.
- Atlantic Richfield Company (ARCO) electronic spreadsheet files of oil spills for the Prudhoe Bay Unit Eastern Operating Area (1977 through 1996), Kuparuk River Unit (1977 through 1985 and 1986 through 1996), and Kuparuk River Unit exploration (1986 through 1996).
- Alyeska printed summary report of oil spills greater than 1,000 bbl along the TAPS from 1977 through 1989.
- Joint Pipeline Office electronic database of oil spills along the TAPS (1970 through 1994).

- Bureau of Land Management (BLM) printed reports of oil spills along the TAPS during 1981 and 1982.
- Alaska Department of Environmental Conservation (ADEC) electronic text and spreadsheet files of oil spills from the agency's current oil and hazardous substances spill database (July 1995 through February 1997) and an earlier oil and hazardous substances spill database (1971 through July 1995).
- Alaska Department of Environmental Conservation electronic spreadsheet containing all oil spills in their current oil and hazardous substance spill database to December 2000.
- An unattributed printed summary of oil spills over 100 gallons on the Alaska North Slope and along the TAPS from 1970 through 1981.
- An electronic spreadsheet summary of Alaskan and Canadian oil spills of 100 bbl or greater, from 1978 through 2000, as reported by the Oil Spill Intelligence Report.
- An MMS report that no oil spills of 100 bbl or larger have occurred in the Alaska Outer Continental Shelf Beaufort or Chukchi sea(s) study area.
- Alyeska electronic spreadsheet file containing all oil spills of 100 bbl or larger from the company's oil-spill database to September 1999.

A review of the reliability and completeness of the data for spills greater than or equal to 500 bbl (Hart Crowser, Inc. 2000) indicates that the available information was most reliable for 1985 through 2000, based on written documentation or lack of documentation and spills before that period. The MMS determined that spills greater than or equal to 100 bbl were documented and included in the database since 1985. In 1985, the ADEC began tracking spills in an electronic format. Although Hart Crowser, Inc. (2000) states that the database is complete for the years since production began, the BLM prefers to use 1985 as the starting point of reliability. Any uncertainty in documenting spills before that time is a concern because it is typical for spills to occur more frequently during field and pipeline startup.

Six crude oil spills greater than or equal to 500 bbl associated with onshore or offshore Alaska North Slope oil production occurred from 1985 to 2000. All of the crude oil spills of 500 bbl or greater occurred between 1989 and 2000. No spills greater than or equal to 1,000 bbl were documented during this time period. Of the six spills, one (i.e., a leak in either a 20- or 24-inch flow line from the wells in Kuparuk to the Central Processing Facility) is classified as a pipeline spill. The other five spills are classified as facility spills.

From 1985 to 2000, the median facility spill greater than or equal to 500 bbl on the Alaska North Slope was 663 bbl, and the mean (or average) was 680 bbl. The one pipeline spill had a volume of 510 bbl. For spill analysis, the largest recorded facility spill is used. The largest facility spill on record is 925 bbl. This oil spill analysis uses a pipeline spill of 510 bbl. Rounded to the nearest 100 (to reflect the uncertainty associated with spill estimates), the hypothetical spill sizes become 900 bbl for the facility spill and 500 bbl for the pipeline spill.

### Historical Crude Oil Spills Greater Than or Equal to 500 Barrels From the Trans-Alaska Pipeline

The TAPS oil-spill analysis includes the pipeline and the pump stations, but excludes the Valdez marine terminal. Eight crude oil spills greater than or equal to 500 bbl associated with TAPS occurred from 1977 through 2001. Most large crude oil spills were associated with the start-up of the pipeline. No large spills greater than or equal to 1,000 bbl occurred from 1981 to 2000. On October 4, 2001, a bullet punctured the 48-inch TAPS mainline; approximately 6,800 bbl of crude oil were released from this intentional sabotage. Using the highest reported spill-quantity values, the mean (average) recorded crude oil spill greater than or equal to 500 bbl from 1977 to 2001 is 5,462 bbl, and the median is 4,381 bbl. Using the Alyeska Pipeline Service Company reported values, the mean and median spill sizes are 4,089 and 1,650, respectively. For spill analysis, the highest reported spill quantity mean is used and rounded to the nearest 100. Therefore, the mean hypothetical TAPS spill size is 5,500 bbl (median 4,400 bbl) for this oil spill analysis.

### Historical Crude Oil Spills Greater Than or Equal to 1,000 Barrels from Tankers

Eleven crude oil spills greater than or equal to 1,000 bbl associated with the TAPS tankers have occurred from 1977 to 1999. The mean size for all TAPS tanker spills is 27,000 bbl and the median is 5,000 bbl. For in-port spills, the mean and median are 5,600 bbl and 5,300 bbl, respectively. For at-sea spills, the mean and median are 40,600 bbl and 4,900 bbl, respectively. The TAPS tanker spills are smaller than worldwide tanker spills and slightly smaller than tanker spills in U.S. waters (Anderson and Labelle 2000).

### Historical Crude Oil Spills From Blowouts on the Alaska North Slope

The record for Alaska North Slope blowouts is not validated, but is presented as the best available information. There are two written reports regarding blowouts on the Alaska North Slope: Mallory (1998) and Fairweather (2000). Fairweather (2000) found 10 blowouts—six that Mallory had identified for the period 1974 to 1998 and four that occurred before 1974. Of the 10 blowouts, 9 were gas and 1 was oil. The 1950 oil blowout was unspectacular and could not have been avoided, as there were no casings or blowout preventors available (Fairweather 2000). Drilling practices from 1950 would not be relevant today. A third study confirmed that no crude oil spills greater than or equal to 100 bbl from blowouts occurred from 1985 through 1999 (Hart Crowser, Inc. 2000). A recent report titled *Blowout Frequency Assessment of Northstar* (Scandpower AS 2001) uses statistical blowout frequencies modified to reflect specific field conditions and operative systems at Northstar. This report concludes that the blowout frequency for drilling in the oil-bearing zone at Northstar is $1.5 \times 10^{-5}$ per well drilled. In comparison, the average statistical blowout frequency for a development well in the North Sea and U.S. Gulf of Mexico is $7.4 \times 10^{-5}$ per well. This same report estimates that the statistical frequency of a blowout spill with a size greater than 130,000 bbl is $9.4 \times 10^{-5}$ per well drilled for Northstar.

However unlikely a blowout may be, it is an important concern to the public; therefore, the effects of a 120,000 bbl (15 day) spill are analyzed in Section 4.10 (Low Probability, Very Large Oil Spill).

## K.1.1.2 Historical Large Crude Oil Spill Rates

Oil spill rates are the number of spills that occur over some exposure variable. The exposure variable can be bbl of oil produced or pipeline miles per year. Oil spill rates are estimated for the Alaska North Slope, the TAPS, and the TAPS tankers using historical spill data.

### Alaska North Slope Spill Rate 1985-2000 Based on Volume

No Alaska North Slope facility or pipeline spills greater than or equal to 1,000 bbl from Alaska North Slope production have occurred since 1985. No documentation for crude oil spills greater than or equal to 100 bbl occurring prior to 1985 was found, but spill records dated prior to 1985 have not been validated as complete because of missing or incomplete documentation.

As noted above, five facility spills and one pipeline spill are documented from 1985 to 2000. Total Alaska North Slope production was estimated to be 9.36 billion barrels (Bbbl) of crude oil and condensate (Alyeska Pipeline Service Company 2001, McMaines 2001). Anderson and LaBelle (2000) calculated Alaska North Slope spill rates from 1985 to 1998, hence they are slightly different from the spill rates calculated, using the 1985 to 2000 information, for this Amended IAP/EIS. The spill rate of 0.53 large spills per Bbbl handled was calculated for Alaska North Slope facility spills, using the entire record of five spills from 1985 to 2000. The BLM and MMS use the 1985 to 2000 time period because spills greater than 100 bbl have been documented since 1985. In addition, the ADEC began an electronic database of oil spills in 1985. The BLM and MMS consider the database most reliable from 1985 forward. The Alaska North Slope pipeline spill rate of 0.11 large spills per Bbbl handled was based on the record of one pipeline spill from 1985 to 2000. The combined large crude oil spill rate for facilities and pipelines is 0.64 spills per Bbbl handled.

#### Trans-Alaska Pipeline Spill Rate 1977-2001 and 1985-2001 Based on Volume and Pipeline-Mile-Year

Flow in the TAPS began on June 20, 1977, with throughput of 112 million barrels (MMbbl) by the end of 1977. Throughput increased to almost 400 MMbbl in 1978, peaked at 744 MMbbl in 1988, and was 370 MMbbl in 2001. The estimated total volume transported through the TAPS during the period 1977 through 2001 is 13.62 Bbbl. The TAPS is 800 miles long.

##### *1977-2001*

There have been 12 crude oil spills greater than or equal to 100 bbl attributed to TAPS operation, 4 of which were less than 500 bbl. Eight spills were greater than or equal to 500 bbl, of which 6 were greater than or equal to 1,000 bbl. The last spill greater than or equal to 1,000 bbl occurred in 2001. The spill rate for spills greater than or equal to 500 bbl of 0.59 spills per Bbbl transported for TAPS was calculated based on the record of 6 accidental and 2 sabotage spills over 13.62 Bbbl of production. The spill rate of 0.000425 large spills per pipeline-mile-year for TAPS was calculated based on the record of 6 accidental and 2 sabotage spills over 18,835 pipeline-mile-years during the period 1977 through 2001.

##### *1985-2001*

For purposes of this oil spill analysis, approximately the same time period (1985-2001) and the same class size (greater than or equal to 500 bbl) as the Alaska North Slope data in section K.1.1.1 (Historical Large Crude Oil Spills) are used. The spill rate of 0.21 large spills per Bbbl transported for TAPS was calculated based on 2 spills over 9.7 Bbbl of oil transported. The TAPS spill rate is 0.00015 large spills per pipeline-mile-year. The rate was also calculated based on 2 spills over 13,605 pipeline-mile-years from 1985 to 2001.

#### Trans-Alaska Pipeline Tanker Spill Rate 1977-1999 Based on Volume

Eleven tanker spills occurred in association with the transportation of Alaska North Slope crude: the *Exxon Valdez* spill and 10 other spills less than or equal to 15,000 bbl (Anderson and LaBelle 2000). No large spills have occurred since 1991. The spill rate of 0.87 spills per Bbbl transported was calculated based on the record of 11 accidental spills over 12.6 Bbbl of production (Anderson and LaBelle 2000).

### K.1.1.3 Estimated Mean Number and Probability of One or More Large Crude Oil Spills for the Northeast National Petroleum Reserve - Alaska

The mean number of large crude oil spills, estimated over the production life of the Planning Area for the No Action Alternative (Alternative A), Alternative B, Alternative C, and the final Preferred Alternative (Alternative D) at the $20, $25, and $30 per bbl price are shown in Table K-2. The mean number of spills is derived from the projected resource volumes and the historic spill rate. The estimated total spill volume in Table K-2 is the total volume for all of the spills estimated for the given alternative and price of oil. For instance, if two spills of 500 bbl each were likely to occur, then the estimated total spill volume would be 1,000 bbl.

The mean number of large spills is zero for all alternatives at $20 per bbl. The mean number of large spills is one for Alternatives B, C, and D at $25 per bbl; no large spills would be expected for Alternative A (the No Action Alternative) at this price. The mean number of spills at $30 per bbl is one for Alternatives B and D; two for Alternative C; and no large spills would be expected for Alternative A at this price. These represent the most likely number of large spills for the each alternative at various prices. For the purposes of this oil spill analysis, it is assumed that for all oil prices, no large spills would occur with Alternative A, one large spill would occur with Alternatives B and D, and two large spills would occur with Alternative C.

**Table K-2. Large Crude Oil Spills Estimated Over the Production Life of the Northeast National Petroleum Reserve - Alaska.**

| Alternative | Resources (Bbbl) | Spill Rate (Spills/Bbbl) | Assumed Spill Size (bbl) | Estimated Mean Number of Spills[1] | Estimated Total Spill Volume[2] (bbl) |
|---|---|---|---|---|---|
| **Crude Oil at $20/bbl** | | | | | |
| A | 0.130 | 0.64 | 500 or 900 | 0.08 | 0 |
| B | 0.216 | 0.64 | 500 or 900 | 0.14 | 0 |
| C | 0.255 | 0.64 | 500 or 900 | 0.16 | 0 |
| D | 0.164 | 0.64 | 500 or 900 | 0.10 | 0 |
| **Crude Oil at $25/bbl** | | | | | |
| A | NA | 0.64 | 500 or 900 | NA | NA |
| B | 1.544 | 0.64 | 500 or 900 | 0.99 | 500 or 900 |
| C | 1.855 | 0.64 | 500 or 900 | 1.19 | 500 or 900 |
| D | 1.247 | 0.64 | 500 or 900 | 0.80 | 500 or 900 |
| **Crude Oil at $30/bbl** | | | | | |
| A | 0.600 | 0.64 | 500 or 900 | 0.38 | 0 |
| B | 2.054 | 0.64 | 500 or 900 | 1.31 | 500 or 900 |
| C | 2.488 | 0.64 | 500 or 900 | 1.59 | 1,000 or 1,800 |
| D | 1.727 | 0.64 | 500 or 900 | 1.11 | 500 or 900 |

[1] The estimated mean number of oil spills is based on the estimated resource volume multiplied by the spill rate.
[2] The estimated total spill volume is the total volume for all of the estimated spills for the given alternative and price of oil.
NA = Not applicable.

The projected mean number of spills (listed in Table K-1) is used to estimate the chance of one or more large spills occurring. This statistical calculation is based on the assumption that spills occur as a Poisson process, with volume of oil produced as the variable (Smith et al. 1982). The Poisson distribution is used to model the number of random occurrences of a rare event within a given time interval. The estimated chance of one or more large spills occurring for Alternatives A, B, C, and D at the $20 per bbl price is 8 percent, 13 percent, 15 percent, and 10 percent, respectively. There is a 63, 69, and 55 percent chance of one or more large spills occurring under Alternatives B, C, and D, respectively, at the $25 per bbl price. There is a 32, 73, 80, and 67 percent chance of one or more large spills occurring under Alternatives A, B, C, and D, respectively, at the $30 per bbl price.

## K.1.2 Probability of a Small Crude Oil Spill - Less Than 500 Barrels

A total small spill rate of approximately 618 spills per Bbbl handled, calculated from the Alaska North Slope record of small spills, is used here. This spill rate consists of 178 small crude oil spills per Bbl and 440 small refined product spills per Bbbl. Since the companies and regulators that now operate onshore will likely participate onshore in the Northeast National Petroleum Reserve – Alaska, it seems reasonable to assume that the spill rate in the Northeast National Petroleum Reserve – Alaska will be similar to the rate on the Alaska North Slope.

Historical oil spill information and simple statistical methods are used to derive the following information about small crude and refined oil spills that occur on the Alaska North Slope:

- estimates of how often a spill occurs for every Bbbl of oil produced (oil-spill rates);
- estimates of the mean number of oil spills; and
- estimates of the mean and median size of oil spills from facilities, pipelines, and flow lines combined.

This information is used to estimate the number, size, and distribution of operational small spills that may occur in the Planning Area.

The historical information consists of crude and refined oil spills reported to the ADEC and the Joint Pipeline Office by the oil industry. Crude and refined oil spill rates and patterns from Alaska North Slope oil and gas exploration and development activities are determined for spills greater than or equal to 1 gallon and less than 500 bbl. Refined oil includes aviation fuel, diesel fuel, engine lubricants, fuel oil, gasoline, grease, hydraulic oil, transformer oil, and transmission oil. The Alaska North Slope oil spill analysis includes onshore and offshore oil and gas exploration and development spills from the Point Thompson Unit, Badami Unit, Kuparuk River Unit, Milne Point Unit, Prudhoe Bay West Operating Area, Prudhoe Bay East Operating Area, and Duck Island Unit.

Oil spill information is provided to the ADEC by private industry in accordance with State of Alaska Regulations, 18 AAC § 75. The ADEC figures are based on initial spill reports and may not contain updated information. Because of increased scrutiny after the *Exxon Valdez* oil spill, information in the ADEC database is most reliable for 1989 and later. Even though the integrity of the database cannot be validated thoroughly, the information in the database is still valuable because it is the only available data on small spills. For this oil spill analysis, ADEC records were spot checked against spill records from ARCO Alaska and BP. All spills greater than or equal to 1 gallon and less than 500 bbl occurring in the 1989 through 2000 time period were included in the oil spill analysis. A simple analysis of operational small oil spills was performed, and spill rates were estimated without regard to differentiating operation processes. The ADEC database structure does not facilitate quantitative analysis of Alaska North Slope oil spill rates separately for platforms, pipelines, or flow lines without further documentation and validation.

#### K.1.2.1 Historical Small Crude Oil Spill Rates and Patterns on the North Slope

Because this analysis of crude oil spills was performed collectively for all Alaska North Slope facilities, pipelines, and flow lines, the pattern that emerged was one of numerous small spills. Of the crude oil spills that occurred between 1989 and 2000, the ADEC database indicates that:

- 18 percent were less than or equal to 1 gallon;
- 54 percent were less than or equal to 5 gallons; and
- 99 percent were less than 25 bbl.

The small spill sizes in the database range from less than 1 gallon to 425 bbl. The mean crude oil spill size on the Alaska North Slope is 2.7 bbl, and the median spill size is 5 gallons. For purposes of the oil spill analysis in this Amended IAP/EIS, a mean crude oil-spill size of 3 bbl is assumed for small spills.

The database indicates that the causes of small crude oil spills on the Alaska North Slope, in decreasing order of frequency, are:

- leaks
- faulty valves/gauges
- vent discharges
- faulty connections
- ruptured lines
- seal failures
- human error
- explosions

Approximately 30 percent of the spills in the database do not include information on the causes.

The estimated small crude oil spill rate for the Alaska North Slope is 178 spills per Bbbl produced. The mean number, size, and total volume of small spills for each of the alternatives are shown in Table K-3. For this oil spill

analysis, the mean number of small spills is used as the assumed number of spills. The assumed size distribution of those spills for each of the alternatives is shown in Table K-4.

**Table K-3. Small Crude Oil Spills Estimated Over the Production Life of the Northeast National Petroleum Reserve – Alaska.**

| Alternative | Resources (Bbbl) | Spill Rate (Spills/Bbbl) | Assumed Spill Size (bbl) | Estimated Mean Number of Spills[1] | Estimated Total Spill Volume (bbl) |
|---|---|---|---|---|---|
| **Crude Oil at $20/bbl** | | | | | |
| A | 0.130 | 178 | 3 | 23 | 69 |
| B | 0.216 | 178 | 3 | 38 | 114 |
| C | 0.255 | 178 | 3 | 45 | 135 |
| D | 0.164 | 178 | 3 | 29 | 87 |
| **Crude Oil at $25/bbl** | | | | | |
| A | NA | 178 | 3 | NA | NA |
| B | 1.544 | 178 | 3 | 275 | 825 |
| C | 1.855 | 178 | 3 | 330 | 990 |
| D | 1.247 | 178 | 3 | 222 | 666 |
| **Crude Oil at $30/bbl** | | | | | |
| A | 0.600 | 178 | 3 | 107 | 321 |
| B | 2.054 | 178 | 3 | 366 | 1,098 |
| C | 2.488 | 178 | 3 | 443 | 1,329 |
| D | 1.727 | 178 | 3 | 307 | 921 |

[1] The estimated mean number of oil spills is based on the estimated resource volume multiplied by the spill rate.
NA = Not applicable.

**Table K-4. Assumed Size Distribution For Small Crude Oil Spills for the Production Life of the Northeast National Petroleum Reserve – Alaska.**

| Spill Size Range[1] | Estimated Number of Spills Under Each Alternative[2, 3] | | | |
|---|---|---|---|---|
| | Alternative A | Alternative B | Alternative C | Alternative D |
| **<1 bbl** | | | | |
| ≤1 gal | 4 – 19[3] | 7 – 66 | 8 – 80 | 5 – 55 |
| >1 gal and ≤5 gal | 8 – 39 | 14 – 133 | 16 – 161 | 10 – 111 |
| >5 gal and <1 bbl | 5 – 21 | 7 – 72 | 9 – 87 | 6 - 61 |
| Total spills <1 bbl | 17 – 79 | 28 – 271 | 33 – 328 | 21 - 227 |
| **≥1 bbl and < 500 bbl** | | | | |
| >1 bbl and ≤5 bbl | 5 – 22 | 8 – 76 | 9 – 92 | 6 – 64 |
| >5 bbl and ≤ 25 bbl | 1 – 4 | 2 – 14 | 2 – 17 | 1 – 12 |
| >25 bbl and <500 bbl | 0 – 2 | 0 – 5 | 1 – 6 | 0 – 4 |
| Total spills >1 bbl and < 500 bbl | 6 – 28 | 10 – 95 | 12 – 115 | 8 – 80 |
| Total number spills | 23 – 107 | 38 – 366 | 45 – 443 | 29 – 307 |
| Total volume (bbl) | 69 – 321 | 114 – 1,098 | 135 – 1,329 | 87 – 921 |

[1] Spill-size distribution is allocated by multiplying the total estimated number of spills by the fraction of spills in that size category from the ADEC database.
[2] Estimated number of spills is rounded to the nearest whole number.
[3] The ranges are presented as the estimated number of spills at the predicted activity level with $20/bbl oil, to the number predicted with $30/bbl oil.

### K.1.2.2 Historical Small Refined Oil Spill Rates and Types of Spills on the North Slope

Typical refined products spilled are aviation fuel, diesel fuel, engine lube, fuel oil, gasoline, grease, hydraulic oil, transformer oil, and transmission oil. On the Alaska North Slope, diesel spills represent 61 percent of refined oil spills by frequency and 75 percent by volume. Engine lube oil spills are 10 percent by frequency and 3 percent by volume. Hydraulic oil spills are 26 percent by frequency and 10 percent by volume. All other categories of spills are less than 1 percent by frequency and volume. Refined oil spills occur in conjunction with oil exploration and production, and correlate to the volume of Alaska North Slope crude oil produced. As production of crude oil has declined, so has the number of refined oil spills. However, this apparent relationship could be coincidental, as emphasis on pollution prevention has also increased in the last several years. From 1989 to 2000, the spill rate for refined oil was 440 spills per Bbbl produced.

The mean number of refined oil spills during the lifetime of the alternatives is shown in Table K-5.

**Table K-5. Small Refined Oil Spills <500 bbl Estimated Over the Production Life of the Northeast National Petroleum Reserve – Alaska.**

| Alternative | Resources (Bbbl) | Spill Rate (Spills/Bbbl) | Assumed Spill Size (bbl)[1] | Estimated Mean Number of Spills[2,3] | Estimated Total Spill Volume (bbl) |
|---|---|---|---|---|---|
| A | 0.130 – 0.600 | 440 | 0.7 | 57 –264 | 40 – 185 |
| B | 0.216 – 2.054 | 440 | 0.7 | 95 – 904 | 66 – 633 |
| C | 0.255 – 2.488 | 440 | 0.7 | 112 – 1,095 | 78 – 766 |
| D | 0.164 – 1.727 | 440 | 0.7 | 72 - 760 | 50 -532 |

[1] The mean spill size for refined spills on the Alaska North Slope from 1989 through 2000; equivalent to 29 gallons.
[2] The fractional estimated mean spill number and volume are rounded to the nearest whole number.
[3] The ranges represent the estimated number of spills at the predicted activity level with $20/bbl oil to that predicted with $30/bbl oil.

## K.1.3 Probability of a Very Large Oil Spill - Greater Than or Equal to 120,000 Barrels

Size assumptions for very large spills for Planning Area facilities and pipelines are based on response planning standards and discharge estimates for the Alpine oil field (ARCO Alaska 1999, Phillips 2001). Blowouts are unlikely events. While blowouts are often equated with catastrophic spills, very few blowout events have resulted in spilled oil, and the volumes that are spilled are often small.

# K.2 Oil Weathering and Spreading

Information about oil weathering and the aerial extent of an oil spill were estimated from oil weathering models and historical information.

## K.2.1 Modeling Simulations of Oil Weathering

To judge the effect of an oil spill, the following volumes must be estimated:

- the amount of oil that evaporates;
- the amount of oil that disperses; and
- the amount of oil that remains after a certain time period.

Alpine field crude oil was used as the analog of oil types in the Planning Area. Weathering estimates of Alpine field crude oil and Arctic diesel (over a 30-day period) were derived by the SINTEF Oil Weathering Model (OWM), Version 2.0 (Reed et al. 2000).

Individual weathering results for Alpine field crude oil spills from the SINTEF OWM model are shown in Table K-6 and Table K-7. The SINTEF OWM changes both oil properties (density, viscosity, pour point, flash point, and water content) and physical properties (spreading, evaporation, oil-in-water dispersion, and water uptake) of the oil. The OWM performs a 30-day time horizon on the model weathering calculations, but with a warning that the model is not verified against experimental field data for more than 4 to 5 days. The SINTEF OWM has been tested extensively with results from three full-scale field trials of experimental oil spills (Daling and Strom 1999).

The SINTEF OWM does not incorporate the effects of:

- currents
- beaching
- containment
- photo-oxidation
- microbiological degradation
- adsorption to particles
- encapsulation by ice

The spill sizes chosen for oil weathering were 500 and 900 bbl for the Alpine field-type crude oil spill, and 900 bbl for a diesel spill. Two general scenarios were simulated—one in which oil spills into open water, and another in which oil freezes into the ice and melts into 50 percent ice cover. It was assumed that open water occurs July through September, and that a winter spill melts out in July. For open water, the weathering of the 500- and 900-bbl spills was modeled as instantaneous spills. For the meltout spill scenario, the entire spill volume was modeled as an instantaneous spill. Although different amounts of oil could melt out at different times, the MMS assumed a conservative approach—all oil was released at the same time. Results are reported for the end of 1, 3, 10, and 30 days. The assumed fate and behavior of Alpine field crude oil and diesel oil, information that was used in the analysis of the effects of oil on environmental and social resources, are summarized in Table K-6 and Table K-7.

**Table K-6. Fate and Behavior of a Hypothetical 500 bbl Oil Spill From Lagoon Pipelines.[1]**

| Features | Summer Spill[2] | | | | Meltout Spill[3] | | | |
|---|---|---|---|---|---|---|---|---|
| Time after spill in days | 1.0 | 3.0 | 10.0 | 30.0 | 1.0 | 3.0 | 10.0 | 30.0 |
| Oil remaining (percent) | 75.4 | 68.0 | 44.0 | 38.0 | 77.0 | 71.9 | 64.3 | 57.6 |
| Oil dispersed (percent) | 0.6 | 2.0 | 8.0 | 22.0 | 0.0 | 0.1 | 0.7 | 2.4 |
| Oil evaporated (percent) | 24.0 | 30.0 | 36.0 | 40.0 | 23.0 | 28.0 | 35.0 | 40.0 |
| Thickness (mm) | 3.1 | 1.9 | 1.1 | 1.0 | 4.6 | 2.7 | 1.5 | 1.0 |
| Discontinuous area ($mi^2$)[4] | 0.6 | 3.1 | 15.5 | 63.9 | 0.6 | 4.3 | 10.5 | 83.0 |
| Estimated coastline oiled (mi)[5] | 10.5 | | | | 9.9 | | | |

[1] Calculated with the SINTEF Oil Weathering Model Version 2.0 (Reed et al. 2000), assuming an Alpine field crude type.
[2] Summer (July through September) and assumes: 12-knot wind speed, 33 degrees Fahrenheit, and 1.3-feet (0.4-meter) wave height.
[3] Spill is assumed to occur in May into first-year ice, pools 0.8 inches (2 cm) thick on ice surface for 2 days at 32 degrees Fahrenheit before meltout into 50 percent ice cover, 11-knot wind speed, and 0.3 feet (0.1 meter) wave heights.
[4] Calculated from Equation 6 of Table 2 in Ford (1985), and is the discontinuous area of a continuing spill or the area swept by an instantaneous spill of a given volume. Ice dispersion occurs for about 30 days before meltout.
[5] Calculated from Equation 17 of Table 4 in Ford (1985), and is the result of stepwise multiple regression for length of historical coastline affected.

The structure of the ADEC Alaska North Slope spill database does not facilitate a quantitative analysis of pipeline spill rates for small spills. The ADEC database specifically identifies five pipeline leaks among 975 spill records. The volumes of these pipeline leaks are 0.7, 5, 18, 125, and 510 bbl. Additionally, any spills occurring or moving off pads would have some potential to enter a river or water body. For the purposes of this oil spill analysis, the percent of crude oil spills occurring on a pad versus off the pad and onto the surrounding environment was estimated. Approximately 65 to 80 percent of all crude oil spills would occur on a pad and have little or no effect on the environment. Approximately 20 to 35 percent could occur in or reach the surrounding environment.

**Table K-7. Fate and Behavior of a Hypothetical 900 bbl Oil Spill From a Lagoon Facility.[1]**

| Features | Summer Spill [2] | | | | Meltout Spill [3] | | | |
|---|---|---|---|---|---|---|---|---|
| Time after spill in days | 1 | 3 | 10 | 30 | 1 | 3 | 10 | 30 |
| Oil remaining (percent) | 75.5 | 68.4 | 57.9 | 40 | 76.9 | 71.8 | 64 | 56.5 |
| Oil dispersed (percent) | 0.5 | 1.6 | 6.1 | 20 | 0.1 | 0.2 | 1 | 3.5 |
| Oil evaporated (percent) | 24 | 30 | 36 | 40 | 23 | 28 | 35 | 40 |
| Thickness (millimeters) | 4.1 | 2.5 | 1.5 | 1 | 6.1 | 3.9 | 1.9 | 1.2 |
| Discontinuous area (square miles)[4] | 0.6 | 4.3 | 21.1 | 86.8 | 1.2 | 5.6 | 26.7 | 112.2 |
| Estimated coastline oiled (miles)[5] | 13.6 | | | | 13.0 | | | |

[1] Calculated with the SINTEF Oil Weathering Model Version 2.0 (Reed et al. 2000), assuming an Alpine field crude type.
[2] Summer (July through September) assumes: 12-knot wind speed, 33 degrees Fahrenheit, and 1.3-feet (0.4-meter) wave height.
[3] Spill is assumed to occur in May into first-year ice, pools 0.8 inches (2 cm) thick on ice surface for 2 days at 32 degrees Fahrenheit before meltout into 50 percent ice cover, 11-knot wind speed, and 0.3 feet (0.1 meter) wave heights.
[4] Calculated from Equation 6 of Table 2 in Ford (1985), and is the discontinuous area of a continuing spill or the area swept by an instantaneous spill of a given volume. Ice dispersion occurs for about 30 days before meltout.
[5] Calculated from Equation 17 of Table 4 in Ford (1985), and is the result of stepwise multiple regression for length of historical coastline affected.

### K.2.2 Observations of Historic North Slope Spill Patterns

The development scenarios for alternatives A, B, C, and D include an onshore pipeline. Of greatest concern would be the possible contamination of the Colville River, because a pipeline could cross or underlie the Colville River and some of its tributaries, and Teshekpuk Lake.

Those spills reaching the surrounding environment generally remain restricted to a limited area of the tundra unless they reach a river, stream, or other water body. The ADEC records are not accurate enough to provide statistical spill size areas. The following are comments based on information from the ADEC database and Behr-Andres et al. (2001). Off-pad spills that occur in or reach the environment generally cover a small area (less than or equal to 500 $ft^2$). Larger areas of contamination occur when wind blows a fine oil mist over a large area. The largest area ever covered was the result of a pipeline spill on December 30, 1993, at drill site 5, well 23, which misted a fine oil spray of 4 bbl over a tundra area of 100 to 145 acres (Mueller 1997). Crude oil from a failed flowline spilled onto a gravel pad, reserve pit, and impoundment. High winds resulted in the crude oil being misted over the snow-covered tundra in an area approximately 330 feet wide and 1,300 feet long (Behr-Andres et al. 2001). Of the off-pad spills that occur, many contact snow or ice, which is cleaned up before the oil reaches the tundra. Smaller spills are likely to be contained within the snow layer, depending on snow depth and density. Larger spills are more likely to reach the ground surface. The ADEC database documents that a spill at Point McIntyre covered approximately 23 acres of snow-covered tundra with 142 bbl of crude oil. Because this area was snow covered, there was little impact to the surrounding environment. If this spill had occurred during the summer, the impacts would have been very different.

## K.3 Cumulative Analysis of Oil Spills

This section discusses how the oil spills for Effects of the Cumulative Case (Section 4.7) were estimated.

### K.3.1 Preparing the Cumulative Analysis

The TAPS pipeline, onshore Alaska North Slope, TAPS tankers, and the Alaska Outer Continental Shelf have varying spill rates and spill-size categories. For a summary of the spill rates and spill size categories that were assumed for analysis of oil spills in the cumulative case, see Table K-8. One noteworthy fact is that most oil originating from either onshore or offshore on the North Slope of Alaska flows through the TAPS pipeline and into TAPS tankers.

**Table K-8. Oil Spill Rates and Spill-size Categories Used to Estimate Large Crude Oil Spills for the Cumulative Analysis.**

| Location | Beaufort OCS | | Alaska North Slope 1985-2001 | | TAPS Pipeline 1985-2001 | | TAPS Tanker 1977-1999 | |
|---|---|---|---|---|---|---|---|---|
| | Spill Rate (Spills/Bbbl) | Size Category (bbl) | Spill Rate (Spills/Bbbl) | Size Category (bbl) | Spill Rate (Spills/Bbbl) | Size Category (bbl) | Spill Rate (Spills/Bbbl) | Size Category (bbl) |
| Offshore | 0.23 | ≥1,000 | - | - | 0.21 | ≥500 | 0.88 | ≥1,000 |
| Onshore | - | - | 0.64 | ≥500 | 0.21 | ≥500 | 0.88 | ≥1,000 |
| Sources: Anderson and LaBelle (2000), Bercha Group, Inc. (2002), and USDOI MMS (2002). | | | | | | | | |

Estimates of past, present, and reasonably foreseeable production are used for the quantitative analysis of oil spills. Past, present, and reasonably foreseeable production contributes 14.4 Bbbl in reserves and resources, with the Planning Area contributing an additional 1.5 Bbbl (the mean resource value for the Planning Area), for a total of 15.9 Bbbl.

## K.3.2 Estimating Possible Future Spills From All Sources

The estimated mean number and volume of spills for the cumulative case are shown in Table K-9. The likely number of additional oil spills in the Beaufort Sea, onshore, along the TAPS pipeline, or tanker route due to projects in the Planning Area is two. Thus, for purposes of analysis of the cumulative case, it is assumed that the Planning Area would contribute a total of two additional oil spills offshore in the Beaufort Sea, onshore, or along the TAPS pipeline or tanker route.

The Beaufort Sea pipeline and platform spill size range used in the analysis is 1,500 to 4,600 bbl. The onshore spill size range used is 500 to 900 bbl. For the cumulative case, a TAPS pipeline spill of 4,400 bbl is estimated. The average spill sizes from TAPS tankers and the distribution of the number of spills used for this analysis is as described in the Northwest National Petroleum Reserve – Alaska IAP/EIS (USDOI BLM and MMS 2003).

It is estimated that one spill greater than or equal to 1,000 bbl would occur as a result of activities in the Beaufort Sea over the lifetime of Planning Area projects. This estimate is based on production from past, present, and reasonably foreseeable development. Possible offshore sources in these categories (past, present, and reasonably foreseeable development) include Endicott, Northstar, Kalubik, Gwydyr Bay, Flaxman Island, Liberty, Kuvlum, and Hammerhead. This estimate also includes potential production from undiscovered resources on federal leased tracts in the Beaufort Sea.

It is estimated that eight spills greater than or equal to 500 bbl would occur onshore before entering the TAPS pipeline. One of these spills is likely to be related to Planning Area projects.

It is estimated that three spills greater than or equal to 500 bbl would occur along the TAPS pipeline, although it is unlikely that the additional throughput given Planning Area projects would increase the number of spills.

Fourteen spills greater than or equal to 1,000 bbl are expected to occur as a result of projects along the TAPS tanker route, one would be expected to be due to the additional volume from Planning Area projects. Of these:

- nine spills with a mean size of 4,000 bbl—four in port and two at sea—would be expected to occur;
- four spills with a mean size of 13,000 bbl would be expected to occur at sea; and
- one spill with a size ranging from 200,000 to 260,000 bbl (for purposes of analysis 250,000 bbl) would be expected to occur at sea.

Previous studies show that the chance of one or more spills both occurring and contacting land along the U.S. coast adjacent to the TAPS tanker route is less than or equal to 3 percent (LaBelle et al. 1996).

**Table K-9. Cumulative Oil-Spill-Occurrence Estimates ≥500 bbl and ≥1,000 bbl over Assumed 15-20 Year Production Life of the Northeast National Petroleum Reserve – Alaska.**

| Spill Location and Timeframe | Crude-Oil Spills | | | | | |
|---|---|---|---|---|---|---|
| | Reserves and Resources (Bbbl) | Spill Rate (Spills/ Bbbl) | Size Category | Assumed Size (bbl) | Most Likely Number | Estimated Mean Number of Spills |
| Offshore | | | | | | |
| Past, present, and reasonably foreseeable | 2.80 | 0.23 | ≥1,000 bbl | NA | 1 | 0.64 |
| Planning Area | NA | 0.23 | ≥1,000 bbl | NA | NA | NA |
| **Total** | **2.80** | **0.23** | **≥1,000 bbl** | NA | **1** | **0.64** |
| Onshore | | | | | | |
| Past, present, and reasonably foreseeable | 11.6 | 0.64 | ≥500 bbl | 500–900 | 7 | 7.42 |
| Planning Area | 1.5 | 0.64 | ≥500 bbl | 500–900 | 1 | 0.96 |
| **Total** | **13.1** | **0.64** | **≥500 bbl** | **500–900** | **8** | **8.38** |
| TAPS (Pipeline) | | | | | | |
| Past, present, and reasonably foreseeable | 14.4 | 0.21 | ≥500 bbl | 4,400 | 3 | 3.02 |
| Planning Area | 1.5 | 0.21 | ≥500 bbl | 4,400 | 0 | 0.32 |
| **Total** | **15.9** | **0.21** | **≥500 bbl** | **4,400** | **3** | **3.34** |
| TAPS (Tanker ) | | | | | | |
| Past, present, and reasonably foreseeable | 14.4 | 0.88 | ≥1,000 bbl | varies | 13 | 12.67 |
| Planning Area | 1.5 | 0.88 | ≥1,000 bbl | varies | 1 | 1.32 |
| **Total** | **15.9** | **0.88** | **≥1,000 bbl** | **varies** | **14** | **13.99** |

Note: The ADEC database has no significant crude oil spills on the North Slope resulting from well blowouts and no facility or onshore pipeline spills greater than 1,000 barrels for the years 1985-2000.
NA = Data not available or not applicable.
Source: USDOI MMS (2002).

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# APPENDIX L

# MEMORANDUM OF UNDERSTANDING TO ESTABLISH CABIN AND CAMPSITE REGISTRY

**BLM 2004-06-NFO-020**

**MEMORANDUM OF UNDERSTANDING**

**Between**

**The Bureau of Land Management – Northern Field Office**

**And**

**The North Slope Borough**

Concerning
The Establishment of a Subsistence Cabin and Campsite Registry and Authorization Program for the National Petroleum Reserve-Alaska (NPR-A)

I. PURPOSE. This Memorandum of Understanding (MOU) provides the procedures for cooperation between the Bureau of Land Management, Northern Field Office (BLM) and the North Slope Borough (NSB) to establish a program to address the issue of the long-term protection and management of traditional and historical subsistence cabins and campsites (cabins) located on public lands within the National Petroleum Reserve-Alaska (NPR-A). The program established pursuant to this MOU is intended to support the subsistence lifestyle of local residents and des not to convey legal ownership of federal lands. The management program consists of an inventory and recordation of cabins and campsites within NPR-A, the identification of local residents who have used these cabins and campsites, and a process to authorize their long-term use.

II. OBJECTIVES. Both parties to this MOU recognize the importance of NPR-A in helping to meet the nation's future energy needs. The parties also recognize that funds provided through NPR-A Energy Impact Grants and the taxation of oil and gas infrastructure by the NSB provides important sources of revenue to the people of the North Slope. Continued access to public lands for oil and gas exploration, development and production is essential to meet management objectives for NPR-A and help secure a reliable, long-term source of revenue for the NSB.

At the same time, the parties to this MOU acknowledge that over the past 70 years local residents have built an estimated 70 to 100 shelter cabins on public lands administered by BLM. These cabins provide direct support for traditional subsistence activities and are vital to the health, safety and cultural well being of subsistence users. According to BLM records, many of these cabins have been built without official authorization. Historically BLM has made the decision to accept the

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existence and use of these cabins and has refrained from taking any action to have these structures removed. However, with the renewed interest in oil and gas leasing in NPR-A, especially near the communities of Barrow, Atqasuk, Nuiqsut and Wainwright, local subsistence users have become concerned that BLM may initiate formal trespass actions as a means to facilitate oil and gas and related activities on public lands.

The objectives of this MOU are to:

A. Create a stable, trusting environment that assures cabin and campsite users will continue to have access and use of their traditional subsistence use sites with minimal restrictions.
B. Establish cabin and campsite registry and authorization program to provide for the long-term protection and management of traditional subsistence cabins previously built without authorization on BLM administered public lands within NPR-A. Such a program does not convey legal ownership of the underlying public lands but rather, grants official approval by BLM to the users and their heirs that they have the right to use and maintain their cabin(s) and/or campsite(s) to support their subsistence activities.
C. Reduce the risk to the environment, including the area's fish and wildlife resources, caused by the improper storage of fuel or disposal of human waste, solid waste and garbage at cabin and campsite locations that might pollute public lands or encourage the expansion of habitat of predator species that impact nesting waterfowl, including federally listed species.
D. Promote public health and safety for local residents as they participate in traditional subsistence activities within NPR-A.
E. Promote the social and cultural well being of local residents as they participate in traditional subsistence activities through the continued use of subsistence cabins and campsites.
F. Promote and reinforce a spirit of environmental ethics among current and future generations of subsistence users.
G. Facilitate communications between cabin and campsite users, BLM and the oil and gas industry to prevent unreasonable conflicts with traditional subsistence use activities and oil and gas and related activities authorized by BLM.
H. Resolve disputes between cabin users that may arise over subsistence use areas, subsistence harvests, and other related matters.
I. Ensure cabin and campsite users will have the flexibility to improve, expand or relocate their subsistence cabins to meet changing environmental conditions and subsistence needs of their families.

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J. Provide cabin and campsite users with an opportunity to request reconsideration of decisions by the BLM that would eliminate or unduly restrict their subsistence use of the land.

III. AUTHORITIES

A. Naval Petroleum Reserve Production Act of 1976 (NPRPA ) (90 Stat. 303) through implementing regulations contained in 43 CFR Parts 2360 and 2361, authorizes the Bureau of Land Management to manage and protect lands within the National Petroleum Reserve in Alaska. Regulations contained in 43 CFR 2361.2 (Use Authorizations) authorize the Bureau of Land Management to develop procedures and issue use authorizations as may be necessary to carry out its responsibilities under the Act.

B. The North Slope Borough was established under the laws of the State of Alaska as a first class borough on July 2, 1972. It adopted its home rule charter through election in 1974.

IV. RESPONSIBILITIES AND PROCEDURES.

The parties to this MOU recognize that local residents maintain subsistence sites on public lands that are uniquely important to their ability to catch fish, hunt caribou, moose and fur bearing animals as well as gather other natural resources. Tent sites, cabin sites and other locations represent strategic locations that are historically significant and essential for maintaining a subsistence life style or to continue important elements of their culture.

It is the policy of the Bureau of Land Management, consistent with the provisions of Title VIII of ANILCA and the requirements of the Naval Petroleum Production Reserve Act of 1976, to recognize the use of lands in NPR-A for sites that support subsistence activities.

The North Slope Borough has the authority and responsibility for the health, safety and welfare of its residents within its area of jurisdiction, including NPR-A.

A. The North Slope Borough agrees to:

1. As long as the Borough continues to fund GIS it will maintain its current GIS database of Fixed Cabins and Campsites and provide BLM with periodic updates as new information becomes available. This information will serve as the basis for developing and maintaining a cabin registry and authorization program.
2. Receive and hold the master BLM authorization to establish a cabin and campsite registration and authorization program and

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to administer said program according to mutually agreed upon terms, conditions and procedures.

3. Make initial contact with all users of cabins and campsites located in the NPR-A to inform them of the establishment of a cabin and campsite registry and authorization program.
4. Conduct one or more informational meetings between BLM and cabin and campsite users to answer questions and address concerns of local residents about the cabin registry and authorization program.
5. Conduct an annual meeting of cabin and campsite users to provide updated information concerning on-going and planned oil and gas and related activities occurring within NPR-A. Industry representatives may be invited to participate as appropriate.
6. Determine if subsistence activities by individuals or families are taking place at a sufficient level to justify the building of new cabins or campsites or improving an existing cabins and campsites.
7. Make the final determination concerning who may occupy specific cabin and campsite locations and what type of improvements may be made to such sites.
8. Establish and administer a process to resolve disputes that might arise between cabin and campsite users concerning subsistence use areas, harvest levels and related matters.
9. Periodically monitor cabins and campsite locations to determine if activities and uses at such locations are consistent with the objectives of this MOU. When objectives are not being met, the NSB will take action to bring the camp or cabin site user into compliance.
10. Provide BLM with periodic updates on the status of the cabin and campsite registry and authorization program.

B. The BLM agrees to:

1. Recognize the use of public lands within the NPR-A for tent sites, cabin sites, ice cellars and related improvements that support customary subsistence activities through the issuance of a special letter of authorization. Such authorization does not convey legal ownership of the underlying public lands nor does it grant the recipient authority to veto or otherwise effect the implementation of land use decisions made by the BLM for the management of NPR-A. However, such an authorization does commit the BLM to make every effort to fully implement planning stipulations, including resource protection, subsistence and consultation stipulations as prescribed in Record of Decision for

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the Northeast NPR-A Integrated Activity Plan and subsequent plans for other areas of NPR-A.

2. Issue an authorization to the North Slope Borough to establish and administer a cabin and campsite registry program.
3. Provide funds in the amount of $25,000 to the North Slope Borough to administer a cabin and campsite registry and authorization program. Funds are to be used to monitor use, cover administrative costs, maintain/update information, take corrective action and resolve disputes. *Actual compensation or reimbursement of funds will be accomplished through the appropriate instrument or agreement.*
4. Keep the North Slope Borough informed of oil and gas and related activities that might conflict with subsistence uses of public lands with the NPR-A.

C. Both Parties agree:

1. In consideration of their mutual promises stated within this MOU, each party forfeits any right of action that it may later acquire against any other party to the agreement for the loss or damage to its property, or to property which it may have an interest.
2. The United States of America shall not be liable for any damage incident to the performance of work under this agreement to the other parties of this agreement and the other parties expressly waive any and all claims against the United States of America for compensation on any loss, damage, personal injury or death occurring as a consequence of the performance of this MOU.
3. Nothing in this MOU shall be construed as obligating the parties to expand or as involving the United States on any contract or other obligation for the future payment of money in excess of appropriations administratively allocated for implementation of this MOU.
4. The parties shall meet on an annual basis to monitor the implementation of this MOU.
5. Through consultation requirements of the Record of Decision for the Northeast NPR-A Integrated Activity Plan and subsequent plans for other areas of NPR-A, establish procedures to provide cabin users with an opportunity to request reconsideration of decisions that may affect their subsistence activities at cabin and campsites.
6. Develop an operational plan that defines procedures, schedules, terms and conditions, and other aspects of the cabin and campsite registry and authorization program.

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V. ADMINISTRATION.

A. Parties will review this MOU at least every five years to determine its adequacy, effectiveness and continued need.
B. Any party may propose changes in this MOU. Any changes will be in the form of an amendment and will not take effect until all parties have agreed and signed the amendment.
C. Nothing in this MOU will be construed as affecting the authorities of the parties. Nothing will be construed as binding beyond the parties' respective authorities, or to require the parties to obligate or expend funds in excess of available appropriations.
D. This MOU in no way restricts the parties from participating in similar activities or arrangements with other public or private agencies, tribal governments, organizations, or individuals.
E. Nothing is this MOU precludes the North Slope Borough from entering into an agreement, contract or other similar arrangement with another party to implement actions contained in this MOU. The terms and conditions of such arrangements will be reviewed and approved by the BLM prior to implementation.
F. This MOU shall become effective when signed by both parties. The MOU shall continue until written termination by mutual agreement or by either party giving 30 days prior written notice to the other parties.
G. Local contacts for the BLM will be the Field Manager of the Northern Field Office or, in his/her absence, the Associate Field Manager. The North Slope Borough's (NSB) contact will be the Mayor or his designee.

APPROVED:

__________________________________ _______________

Field Manager — Date
Bureau of Land Management
Northern Field Office

__________________________________ _______________

George N. Ahmaogak Sr. — Date
Mayor
North Slope Borough

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# GLOSSARY

# GLOSSARY

## A

**Acidophilus:** Acid-loving (as in bacteria or plants); growing well in an acid medium.

**Active floodplain:** The flat area along a waterbody where sediments are deposited by seasonal or annual flooding; generally demarcated by a visible high water mark.

**Aerial:** Consisting of, moving through, found in, or suspended in the air.

**Alluvial:** Sedimentary material consisting mainly of coarse sand and gravel.

**Alternatives:** The different means by which objectives or goals can be attained. One of several policies, plans, or projects proposed for decision making.

**Ambient:** A term used to describe the environment as it exists at the point of measurement and against which changes (impacts) are measured.

**Ambient air quality standard:** Air pollutant concentrations of the surrounding outside environment that cannot legally be exceeded during fixed time intervals within a specific geographic area.

**Amphidromous:** A term used to describe fish that spawn and overwinter in rivers and streams, but migrate during the ice-free summer from these freshwater environments into coastal waters months to feed.

**Anadromous:** A term used to describe fish that mature in the sea and swim up freshwater rivers and streams to spawn. Salmon, steelhead, and sea-run cutthroat trout are examples.

**Anticline:** An inverted bowl-shaped structure formed when sedimentary rock layers are folded to produce an arch or elongated dome.

**Anoxic:** The condition of an environment in which free oxygen is lacking or absent.

**Anthropogenic:** Of, relating to, or resulting from the influence of human beings on nature.

**Aquatic:** Growing, living in, frequenting, or taking place in water; in this Amended IAP/EIS, used to indicate habitat, vegetation, and wildlife in freshwater.

**Aromatic hydrocarbon:** A hydrocarbon with a molecular structure involving one or more benzene unsaturated resonant rings of six carbon atoms, and having properties similar to benzene, which is the simplest of the aromatic hydrocarbons.

**Archaeological resource:** Place(s) where the remnants (e.g., artifacts) of a past culture survive in a physical context that allows for the interpretation of these remains. Archaeological resources can be districts, sites, buildings, structures, or objects and can be prehistoric or historic in nature.

**Aufeis:** Thick ice that builds up as a result of repeated overflow.

**Authorized Officer (AO):** Designated agency personnel responsible for a certain area of a project; for the Northeast National Petroleum Reserve – Alaska, generally the BLM State Director.

# B

**Barrel:** Unit of measurement consisting of 42 gallons of oil or other fluid.

**Baseline data:** Data gathered prior to the proposed action to characterize pre-development site conditions.

**Biodegradable:** Capable of being broken down by the action of living organisms such as microorganisms.

**Biological Assessment (BA):** A document prepared by or under the direction of a federal agency; addresses listed and proposed species and designated and proposed critical habitat that may be present in the action area, and evaluates the potential effects of the action on such species and habitat.

**Black water:** Discharge that includes wastewater from any or all of the following: toilets, urinals, sewage treatment systems.

**Bonding capacity:** An amount, determined by market analysts, based on a government entity's prior bonding experience, actual repayment performance, and its ability to service future, periodic debt. It affects the ability of municipalities to issue and sell bonds to generate funds for capital improvements.

**Bore-hole:** The opening in the ground that is created when drilling a well; may refer to the inside diameter of the bore-hole wall, the rock face that bounds the drilled hole.

**Bottomfast ice:** Ice that is firmly attached or grounded to the bottom of a water body, which is often frozen from top to bottom.

**Brackish:** Water that is intermediate between salt and fresh water; often occurs at the mouths of rivers, where fresh water mixes with salt water.

**Brine:** General description of water that is produced with oil. The water is associated with the oil-producing formation and can have varying amounts of dissolved salts.

**Brood:** A group of young birds being cared for by an adult bird; generally the surviving hatchlings from one or more clutches of eggs.

**Bureau of Land Management (BLM):** An agency of the United States government, under the Department of the Interior, responsible for administering certain public lands of the United States.

**Burin:** A tool flaked into a chisel point for inscribing or grooving bone, wood, leather, stone, or antler.

# C

**Calving area:** A large area where large mammals, particularly ungulates such as caribou, congregate to give birth to their young.

**Capital expenses:** The money spent to purchase or upgrade physical assets, such as buildings or machinery.

**Carrion:** Dead or dying flesh of animals.

**Council on Environmental Quality (CEQ):** An advisory council to the President of the United States; established by the National Environmental Policy Act of 1969. It reviews federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

**Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA):** An act that provided the authority for money administered by the Environmental Protection Agency to identify and clean up hazardous waste sites; also known as Superfund.

**Code of Federal Regulations (CFR):** A codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government.

**cfs:** Cubic feet per second; 1 cfs equals 448.33 gallons per minute.

**Commercial field:** Oil or natural gas fields that can be produced such that they provide a suitable return on investment.

**Commercial oil (or natural gas) reserves:** Oil or natural gas reserves that can be produced such that they provide a suitable return on investment.

**Commercially recoverable:** See commercial oil (or natural gas) reserves.

**Concern:** A point, matter, or question raised by management or the public that must be addressed in the planning process.

**Conglomerate:** Sedimentary rock consisting of gravel and small boulders.

**Consistency determination:** A finding by a state or federal agency that a project or agency action is consistent with a required agency program, guideline, or regulation, such as the Alaska Coastal Zone Management Program.

**Consultation:** Exchange of information and interactive discussion; when the "C" in consultation is capitalized it refers to consultation mandated by statute or regulation that has prescribed parties, procedures, and timelines (e.g. Consultation under NEPA or Section 7 of the Endangered Species Act).

**Criteria:** Data and information that are used to examine or establish the relative degrees of desirability of alternatives or the degree to which a course of action meets an intended objective.

**Cultural resources:** The remains of sites, structures, or objects used by humans in the past, historic or prehistoric. More recently referred to as heritage resources.

**Cumulative effects or impacts:** The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant actions, taken place over a period of time.

# D

**Demersal:** Living near, deposited on, or sinking to the seabed.

**Density:** The number of individuals per a given unit area.

**Deposit:** A natural accumulation, as of precious metals, minerals, coal, gas, and oil that may be pursued for its intrinsic value; gold deposit.

**Development:** The phase of petroleum operations that occurs after exploration has proven successful, and before full-scale production. The newly discovered oil or gas field is assessed during an appraisal phase, a plan to fully and efficiently exploit it is created, and additional wells are usually drilled.

**DEW-Line:** Distant Early Warning Site. A site designed and built during the Cold War as the primary line of air defense warning of "Over the Pole" invasion of the North American Continent.

**Dilution:** The act of mixing or thinning, and therefore decreasing a certain strength or concentration.

**Dispersion:** The act of distributing or separating into lower concentrations or less dense units.

**Dissociable:** Able to break up into simpler chemical constituents.

**Diversity:** An expression of community structure; high if there are many equally abundant species; low if there are only a few equally abundant species. The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

**Draft Environmental Impact Statement (DEIS):** The draft statement of the environmental effects of a major federal action which is required under Section 102 of the National Environmental Policy Act, and released to the public and other agencies for comment and review.

**Drilling fluid (mud):** A preparation of water, clay, and chemicals circulated in a well during drilling to lubricate and cool the drill bit, flush rock cuttings to the surface, prevent sloughing of the sides of the hole, and prevent the flow of formation fluids into the bore-hole or to the surface.

**Drilling pad:** A temporary drilling site, usually constructed of local materials such as gravel.

**Duck pond:** A small, flat-bottomed plastic receptacle placed under a vehicle to catch and contain any contaminated fluids that may melt or drip from the underside of the vehicle.

# E

**Economically recoverable:** See commercially recoverable.

**Effect:** Environmental change resulting from a proposed action. Direct effects are caused by the action and occur at the same time and place, while indirect effects are caused by the action but are later in time or further removed in distance, although still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems. Effect and impact are synonymous as used in this document.

**Employment:** Labor input into a production process, measured in the number of person-years or jobs; the number of jobs required to produce the output of each sector. A person-year is approximately 2,000 working hours by one person working the whole year or by several persons working seasonally. A job may be 1 week, 1 month, or 1 year.

**Endangered species:** Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range; plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act.

**Energy budget:** The flow of energy through an organism or ecosystem. For an organism, it is the amount of energy being absorbed (e.g., food) in relation to the amount of energy expended and lost as heat.

**Environment:** The physical conditions that exist within an area (e.g., the area that will be affected by a proposed project), including land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. The sum of all external conditions that affect an organism or community to influence its development or existence.

**Environmental Assessment (EA):** A concise public document, for which a federal agency is responsible, that serves to: 1) briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact; 2) aid an agency's compliance with the National Environmental Policy Act when no environmental impact statement is necessary; and, 3) facilitate preparation of an environmental impact statement when one is necessary.

**Environmental Justice:** The fair treatment and meaningful involvement of all people, regardless of natural origin or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socio-economic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. Executive Order 12898 directs federal agencies to achieve environmental justice as part of their missions by identifying and addressing disproportionately high adverse effects of agency programs, policies, and activities, on minority and low-income populations.

**Environmental Impact Statement (EIS):** An analytical document prepared under the National Environmental Policy Act (NEPA) that portrays the potential impacts to the environment of a Preferred Action and its possible alternatives. An EIS is developed for use by decision-makers to weigh the environmental consequences of a potential decision.

**Erosion:** The wearing away of the land surface by running water, wind, ice, or other geologic agents, including gravitation creep.

**Eskimo:** An ethnonym (name given to a group by another group) referring to speakers of the Inuit language family who live in the Arctic and Subarctic regions of North America (e.g., Canada, Greenland and Alaska) and eastern Siberia.

**Essential Fish Habitat (EFH):** As defined by Congress in the interim final rule (62FR 66551): "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." For the purpose of interpreting the definition of EFH habitat, "waters" include aquatic areas and their associated physical, chemical, and biological properties; "substrate" includes sediment underlying the waters; "necessary" refers to the habitat required to support a sustainable fishery and the managed species contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers all habitat types utilized by a species throughout its life cycle.

**Estuary:** An estuary is a partially enclosed body of water formed where freshwater from rivers and streams flows into the ocean, mixing with the salty seawater. Estuaries and the lands surrounding them are places of transition from land to sea, and from fresh to salt water.

**Ethnographic:** Of or pertaining to the descriptive and analytical study of the culture of particular self-defined groups or communities.

**Exploration:** The search for economic deposits of minerals, gas, oil or coal through the practices of geology, geochemistry, geophysics, drilling, shaft sinking, and/or mapping.

# F

**°F:** Degrees Fahrenheit.

**Fast-ice zone:** Area along the coast covered by sea ice that is continuous with and attached to the shoreline.

**Feasible:** Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

**Final Environmental Impact Statement (Final EIS):** A revision of the Draft Environmental Impact Statement that includes public and agency comments on the draft.

**Fisheries habitat:** Streams, lakes, and reservoirs that support fish populations.

**Fishery:** The act, process, occupation, or season of taking an aquatic species.

**Floodplain:** The lowland and relatively flat area adjoining inland waters, including, at a minimum, that area subject to a 1 percent or greater chance of flooding in any given year.

**Fluvial:** Of or relating to a stream or river.

**Fossil:** Evidence or remnant of a plant or animal preserved in the earth's crust (e.g., skeleton, footprint, or leaf print).

**Fossil fuel:** Petroleum, natural gas, and coal; fuel derived from biologic material that was deposited into sedimentary rocks.

**Frequency:** The number of samples in which a plant or animal species occurs divided by the total number of samples.

**Fugitive dust:** Dust particles suspended randomly in the air, usually from road travel, excavation, and/or rock loading operations.

# G

**Game Management Unit (GMU):** A geographic division made by the Alaska Department of Fish and Game for the management of fish and wildlife in the State. Different GMUs have different hunting and fishing seasons, bag limits, and other harvest rules.

**Geology:** The scientific study of the origin, history, and structure of the earth; the structure of a specific region of the earth's surface.

**Geomorphic:** Pertaining to the structure, origin, and development of the topographical features of the earth's crust.

**Gill net:** Nets made of one or more layers of mesh, used to catch fish by entanglement as they attempt to swim through the net.

**Glacial drift:** Unsorted sediments deposited by glaciers and not subsequently reworked by water; coarse-grained materials (e.g., rock and sand) suspended in a fine-grained (e.g., silt) matrix. The term applies to all mineral material transported by a glacier and deposited directly by or from the ice, or by running water emanating from a glacier.

**Global warming:** An increase over time of the average temperature of the earth's atmosphere and oceans. It is generally used to describe the temperature rise over the past century or so, and the effects of humans on the temperature.

**Gray water:** Discharge that includes wastewater from any or all of the following: kitchen sink, shower, drinking water, and laundry.

**Greenhouse gas:** A gas, such as carbon dioxide or methane, that is relatively transparent to the higher-energy sunlight, but traps lower-energy infrared radiation. Greenhouse gases have the ability to allow sunlight to warm the earth but trap the heat in, thereby potentially raising the earth's temperature. Greenhouse gases associated with the "greenhouse effect" and global warming.

**Groundwater:** Water found beneath the land surface in the zone of saturation below the water table.

# H

**Habitat:** The natural environment of a plant or animal, including all biotic, climatic, and soil conditions, or other environmental influences affecting living conditions. The place where an organism lives.

**Hazardous waste:** As defined by the Environmental Protection Agency, a waste that exhibits one or more of the following characteristics: ignitability, corrosivity, reactivity, and/or toxicity. Hazardous wastes are listed in 40 CFR § 261.3 and 40 CFR § 171.8.

**Headwaters:** The upper reaches of a stream where the stream forms.

**Hydrocarbon:** A naturally occurring organic compound comprised of hydrogen and carbon. Hydrocarbons can occur in molecules as simple as methane (one carbon atom with four hydrogen atoms), but also as highly complex molecules, and can occur as gases, liquids, or solids. The molecules can have the shape of chains, branching chains, rings, or other structures. Petroleum is a complex mixture of hydrocarbons. The most common hydrocarbons are natural gas, oil, and coal.

**Hydrologic system:** The combination of all physical factors, such as precipitation, stream flow, snowmelt, and groundwater that affect the hydrology of a specific area.

# I

**Impermeable:** Not permitting passage of fluids through its mass.

**Impoundment:** The collection and confinement, usually of water (in the case of mining, tailings materials), in a reservoir or other storage area.

**Increment:** An amount of change from an existing concentration or amount, such as air pollutant concentrations.

**Indigenous:** Having originated in and being produced, growing, living, or occurring naturally in a particular region or environment.

**Indirect impacts:** Impacts that are caused by an action, but are later in time or farther removed in distance, although still reasonably foreseeable.

**Infrastructure:** The underlying foundation or basic framework; substructure of a community (i.e., schools, police, fire services, hospitals, water, and sewer systems).

**Insect-relief area:** An area of the North Slope with relatively low numbers of insects that is used by caribou for relief from insects.

**Interstitial ice:** Ice found in cavities or lodged between soil grains or rock crevices.

**Irretrievable:** A term that applies to losses of production, harvest, or commitment of renewable natural resources. For example, some or all of the wildlife forage production from an area is irretrievably lost during the time an area is used as an oil or gas development site. If the use changes, forage production can be resumed. The production lost is irretrievable, but the act is not irreversible.

**Irreversible:** A term that applies primarily to the use of nonrenewable resources, such as minerals or cultural resources, or to those factors that are renewable only over long time spans, such as soil productivity. Irreversible also includes loss of future options.

**Isobath:** Depth interval contour, as commonly mapped for lake or ocean bottoms.

# J

**Jurisdictional wetland:** A wetland area delineated and identified by specific technical criteria, field indicators, and other information, for the purposes of public agency jurisdiction. The U.S. Army Corps of Engineers regulates "dredging and filling" activities associated with jurisdictional wetlands. Other federal agencies that can become involved with matters that concern jurisdictional wetlands include the U.S. Department of Interior's Fish and Wildlife Service, the Environmental Protection Agency, and the Natural Resource Conservation Service.

# K

# L

**Landfast ice:** Stationary ice that is continuous with, and attached to, the shoreline and extends out into the waterbody.

**Landform:** Any physical, recognizable form or feature on the earth's surface having a characteristic shape, that is produced by natural causes. Landforms provide an empirical description of similar portions of the earth's surface.

**Land management:** The intentional process of planning, organizing, programming, coordinating, directing, and controlling land use actions.

**Landscape:** The sum total of the characteristics that distinguish a certain area on the earth's surface from other areas; these characteristics are a result not only of natural forces but also of human occupancy and use of the land. An area composed of interacting and interconnected patterns of habitats (ecosystems), which are repeated because of geology, landforms, soils, climate, biota, and human influences throughout the area.

**Land status:** The ownership status of lands.

**Land use allocation:** The assignment of a management emphasis to particular land areas with the purpose of achieving the goals and objectives of some specified use(s) (e.g., campgrounds, wilderness, logging, and mining).

**Laterally discontinuous:** Not continuous in the horizontal plane. For example, in an area with laterally discontinuous permafrost, the permafrost is not uniformly found across the entire area without interruption.

**Lead:** Long cracks in the ice, used by both whales and boats to travel through the water.

**Liquid natural gas:** Natural gas which has been liquefied by reducing its temperature to -260 °F at atmospheric pressure. It will remain as a liquid at -116 °F and 673 pounds per square inch above atmospheric pressure.

**Listed species:** Species that are listed as threatened or endangered under the Endangered Species Act of 1973 (as amended).

**Long term impacts:** Impacts that normally result in permanent changes to the environment. An example is the loss of habitat due to development of a gravel pit. For each resource, the definition of long-term may vary.

# M

**Maktak:** Eskimo delicacy consisting of the skin and the thin layer of subcutaneous fat of whales.

**Management activity:** A human activity imposed on a landscape for the purpose of harvesting, traversing, transporting, or replenishing natural resources.

**Management area:** An area delineated on the basis of management objective prescriptions.

**Management concern:** An issue, problem, or condition that influences the range of management practices identified in a planning process.

**Management direction:** A statement of multiple use and other goals and objectives, and the associated management prescriptions, standards, and guidelines for attaining them (36 CFR § 219.3).

**Masu:** A starchy tuber found in Arctic and Subarctic regions (vernacular is "Eskimo potato").

**Mean:** A statistical value calculated by dividing the sum of a set of sample values by the number of samples. Also referred to as the arithmetic mean or average.

**Migratory:** Moving from place to place, daily or seasonally.

**Mitigation:** Steps taken to: 1) avoid an impact altogether by not taking a certain action or parts of an action; 2) minimize an impact by limiting the degree or magnitude of the action and its implementation; 3) rectify an impact by repairing, rehabilitating, or restoring the affected environment; 4) reduce or eliminate an impact over time by preserving and maintaining operations during the life of the action; and, 5) compensate for an impact by replacing or providing substitute resources or environments (40 CFR Part 1508.20).

**Memorandum of Understanding (MOU):** Usually documents an agreement reached amongst federal agencies.

# N

**National Environmental Policy Act (NEPA):** An act declaring a national policy to encourage productive and enjoyable harmony between humankind and the environment; promote efforts to prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity; enrich the understanding of the ecological systems and natural resources important to the nation; and establish a Council on Environmental Quality.

**Net present value (NPV):** The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.

**National Pollutant Discharge Elimination System (NPDES):** A program authorized by Sections 318, 402, and 405 of the Clean Water Act, and implemented by regulations 40 CFR § 122. The NPDES program requires permits for the discharge of pollutants from any point source into waters of the United States.

**No-Surface-Occupancy:** An area that is open for mineral leasing but analysis has found that in order to protect other resource values, no surface occupancy is permitted for oil and gas facilities or infrastructure.

# O

**Objective:** A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used to achieve identified goals.

**Oiled:** Having oil on skin, fur, or feathers after coming into contact with an oil spill.

**Ozone:** Form of oxygen found largely in the stratosphere; a product of the reaction between ultraviolet light and oxygen.

# P

**Particulates:** Small particles suspended in the air, generally considered pollutants.

**Pelagic:** Pertaining to the ocean and especially to animals (typically marine mammals, birds, or fish) that live at the surface of the ocean away from the coast.

**Per capita income:** Total income divided by the total population.

**Performance-based stipulation:** A stipulation applied to leases that provides a stated objective that must be met, along with requirements and guidelines, but provides some leeway as to how that objective can be met and maintained by the lessee; compare to prescriptive-based stipulation.

**Permafrost:** Permanently frozen ground.

**Permanent oil and gas facilities:** Production facilities, pipelines, roads, airstrips, production pads, docks, seawater treatment plants, and other structures associated with oil and gas production that occupy land for more than 1 winter season. Material sites and seasonal facilities, such as ice roads, are excluded, even when the pads are designed for use in successive winters.

**Permeability:** The property or capacity of a porous rock, sediment, or soil for transmitting a fluid; a measure of the relative ease of fluid flow under unequal pressure.

**Photoperiod:** In reference to cycles of light and darkness, the length of time that uninterrupted light is present, generally the length of daylight in a given 24 hour period.

**Physiographic province:** A region having a particular pattern of relief features or land forms that differs significantly from that of adjacent regions (e.g., Arctic Coastal Plain).

**Pingo:** A low conical hill or mound forced up by hydrostatic pressure in an area underlain by permafrost and consisting of an outer layer of soil covering a core of solid ice. Pingos range from 6 to 160 meters in height.

**Planning Area:** An administrative unit determined by the Bureau of Land Management based on resources and management issues. Large properties (such as the National Petroleum Reserve – Alaska) are divided into smaller planning areas so that studies and management decisions can be made on a more local level.

**Plant community:** A vegetation complex, unique in its combination of plants, which occurs in particular locations under particular influences. A plant community is a reflection of integrated environmental influences on the site, such as soils, temperature, elevation, solar radiation, slope aspect, and precipitation.

**Pollution:** Human-caused or natural alteration of the physical, biological, and radiological integrity of water, air, or other aspects of the environment that produces undesired effects.

**Polygon:** A surface landform resulting from repeated freeze-thaw cycles common in permafrost areas. Polygons are bounded by troughs of ice or water and generally occur in networks that form regular geometric designs with multiple square sides of nearly equal lengths.

**Polynyas:** Non-linear openings in the sea ice.

**Porosity:** The ratio of the volume of void space in a material (e.g., sedimentary rock or sediments) to the volume of its mass.

**Potable:** Suitable, safe, or prepared for drinking, as in potable water.

**Pot hunting:** The removal or theft of artifacts from cultural resource sites by untrained individuals for profit and recreation.

**Prescriptive-based stipulation:** A stipulation applied to leases with exacting requirements applying to lessee activities; compare to performance-based stipulation.

**Prevention of significant deterioration (PSD):** A special permit procedure established in the Clean Air Act, as amended, used to ensure that economic growth occurs in a manner consistent with the protection of public health and preservation of air quality related values in national special interest areas.

**Pristine:** Pure, original, and uncontaminated.

**Prospect:** An area of exploration in which hydrocarbons have been predicted to exist in commercially recoverable quantities.

**Public scoping:** A process whereby the public is given the opportunity to provide oral or written comments about the influence of a project on an individual, the community, and/or the environment.

**Pulse:** A group of whales; the term is applied to whales migrating across the Chukchi and Beaufort seas, when there are more individuals in each pod of whales and more pods than usual.

**Pyrogenic:** producing or produced by heat.

# Q

# R

**Raptor:** Bird of prey; includes eagles, hawks, falcons, and owls.

**Recharge:** Absorption and addition of water into the zone of saturation.

**Record of Decision (ROD):** A document separate from, but associated with, an Environmental Impact Statement, which states the decision, identifies alternatives (specifying which were environmentally preferable), and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and, if not, why not (40 CFR § 1505.2).

**Recoverable reserves:** Oil and gas reserves that may be recoverable by the application of technology, but not necessarily commercially recoverable.

**Reservoir (oil or gas):** A subsurface body of rock having sufficient porosity and permeability to store and transmit fluids. Sedimentary rocks are the most common reservoir rocks because they have more porosity than most igneous and metamorphic rocks and form under temperature conditions at which hydrocarbons can be preserved. A reservoir is a critical component of a complete petroleum system.

**Resident:** A species that is found in a particular habitat for a particular time period (e.g., winter resident or summer resident) as opposed to a species found only when passing through during migration.

**Resource Management Plan (RMP):** Comprehensive land management planning document prepared by and for the Bureau of Land Management's administered properties under requirements of the Federal Land Policy and Management Act. Bureau of Land Management lands in Alaska were exempted from this requirement.

**Rideup:** A raised-relief ice formation that is formed when a moving ice sheet is forced up and over other structures such as land or ice.

**Riffles:** Stream segments where the water is relatively shallow, current velocity is relatively high, and sediments are coarse; riffles are located in between areas of deeper, slower water (pools).

**Rift zone:** Zone of faulting where rocks are pulled apart.

**Riparian:** Occurring adjacent to streams and rivers and directly influenced by water. A riparian community is characterized by certain types of vegetation, soils, hydrology, and fauna and requires free or unbound water or conditions more moist than that normally found in the area.

**Risked mean:** The arithmetic average of all possible resource outcomes weighted by their probabilities. Risked (unconditional) estimates of resources such as oil or natural gas consider the possibility that the area may be devoid of those resources. Statistically, the risked mean may be determined through multiplication of the mean of a conditional distribution by the related probability of occurrence.

**Rolligon:** A brand name or make of wheeled vehicle that exerts low pressure on the ground, and is designed to travel across sensitive areas such as tundra with minimal disturbance.

# S

**Satellite field:** An oil reserve located near an existing oil development, allowing shared use of the infrastructure.

**Scenic River:** River designation, under the Federal Wild and Scenic Rivers Program, on the basis of undisturbed and scenic character. Scenic rivers are given special management criteria by federal agencies.

**Scoping process:** A part of the National Environmental Policy Act process; early and open activities used to determine the scope and significance of the issues, and the range of actions, alternatives, and impacts to be considered in an Environmental Impact Statement (40 CFR § 1501.7).

**Sediments:** Unweathered geologic materials generally laid down by or within waterbodies; the rocks, sand, mud, silt, and clay at the bottom and along the edge of lakes, streams, and oceans.

**Sensitive species:** Plant or animal species that are susceptible or vulnerable to activity impacts or habitat alterations. Species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species.

**Short-term impacts:** Impacts occurring during project construction and operation, and normally ceasing upon project closure and reclamation. For each resource the definition of short-term may vary.

**Sidetrack well:** A secondary well-bore drilled away from an original well-bore. A sidetracking operation may be done intentionally or may occur accidentally.

**Significant:** The description of an impact that exceeds a certain threshold level. Requires consideration of both context and intensity. The significance of an action must be analyzed in several contexts, such as society as a whole, and the affected region, interests, and locality. Intensity refers to the severity of impacts, which should weighted along with the likelihood of its occurrence.

**$SO_x$:** Sulfur oxides, including sulfur dioxide ($SO_2$). A product of vehicle tailpipe emissions.

**Sociocultural:** Of, relating to, or involving a combination of social and cultural factors.

**Socioeconomic:** Pertaining to, or signifying the combination or interaction of social and economic factors.

**Soil horizon:** A layer of soil material approximately parallel to the land surface that differs from adjacent genetically related layers in physical, chemical, and biological properties.

**Solid waste:** Garbage, refuse, and/or sludge produced during oil and gas exploration and development activities.

**Spawning:** Production, deposition, and fertilization of eggs by fish.

**Special Use Permit:** A permit issued under established laws and regulations to an individual, organization, or company for occupancy or use of federal or state lands for some special purpose.

**Spill Prevention Control and Countermeasure Plan (SPCC):** A plan that the Environmental Protection Agency requires to be on file within six months of project inception. It is a contingency plan for avoidance of, containment of, and response to spills or leaks of hazardous materials.

**Spine road:** The existing all-season gravel road connecting the oil and gas facilities at Kuparuk (Kuparuk Base Camp) with those at Prudhoe Bay (Prudhoe Bay Operations Center).

**Standard:** A model, example, or goal established by authority, custom, or general consent as a rule for the measurement of quantity, weight, extent, value, or quality.

**Stipulation:** A requirement or condition placed by the Bureau of Land Management on the leaseholder for operations the leaseholder might carry out within that lease. The Bureau of Land Management develops standard stipulations that apply to all future leases within the Northeast National Petroleum Reserve – Alaska.

**Stratigraphic trap:** An oil or gas reservoir in which the hydrocarbons are trapped because of a lateral change in the physical characteristics of the reservoir or a change in the lateral continuity of the rocks.

**Strike:** The act of throwing a darting gun harpoon with a black powder or penthrite bomb into a whale. A strike may or may not result in a dead whale, which may or may not result in a landed whale. The International Whaling Commission considers and counts the number of strikes and landed whales in their quota allocation to the U.S. government (and hence to the Alaska Eskimos). Unused strikes can be transferred to other individuals or groups harvesting whales.

**Subsistence:** Harvesting of plants and wildlife for food, clothing, and shelter. The attainment of most of one's material needs (e.g., food and clothing materials) from wild animals and plants.

# T

**Talik:** An unfrozen section of ground found above, below, or within a layer of discontinuous permafrost. These layers can also be found beneath water bodies in a layer of continuous permafrost.

**Tectonic plate:** A large, thin, relatively rigid plate that moves relative to other plates on the outer surface of the earth.

**Terrestrial:** Of or relating to the earth, soil, or land; inhabiting the earth or land.

**Thermokarst:** Land-surface configuration that results from the melting of ground ice in a region underlain by permafrost. In areas that have appreciable amounts of ice, small pits, valleys, and hummocks form when the ice melts and the ground settles unevenly.

**Threatened species:** A plant or animal species likely to become an endangered species throughout all or a significant portion of its range within the foreseeable future.

**Total petroleum system:** The combination of geologic components and processes necessary to generate and store hydrocarbons, including a mature source rock, migration pathway, reservoir rock, trap, and seal. Includes all the petroleum generated by related source rocks and resides in a volume of mappable rocks. Geologic processes act upon the petroleum system and control the generation, expulsion, migration, entrapment, and preservation of petroleum.

**Traditional knowledge:** An intimate understanding by indigenous peoples of their environment, which is grounded in a long-term relationship with the surrounding land, ocean, rivers, ice, and resources. This understanding includes knowledge of the anatomy, biology, and distribution of resources; animal behavior; seasons, weather, and climate;

hydrology, sea ice, and currents; how ecosystems function; and the relationship between the environment and the local culture.

**Transfer payment:** Money given by the government to citizens, such as Social Security, welfare, and unemployment compensation.

**Trophic system:** The process and organisms that move food energy through the ecosystem, often termed a food chain.

**Tundra:** Level or undulating treeless plain characteristic of northern Arctic regions, consisting of black mucky soil with a permanently frozen subsoil and a dense growth of mosses, lichens, dwarf herbs, and shrubs.

**Turbidity:** A measure of the amount of suspended sediment in water.

# U

# V

# W

**Waterflooding:** The injection of water into geological reservoirs to maintain or increase pressure in the reservoir and thereby assist in the extraction of oil.

**Water quality:** The interaction between various parameters that determines the usability or non-usability of water for on-site and downstream uses. Major parameters that affect water quality include: temperature, turbidity, suspended sediment, conductivity, dissolved oxygen, pH, specific ions, discharge, and fecal coliform.

**Wetlands (biological wetlands):** Those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstance do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include habitats such as swamps, marshes, and bogs (see jurisdictional wetlands).

**Wildcat play:** An unproven and prospective area of oil and gas potential that is outside of existing oil and gas producing areas or zones.

**Wilderness:** Land designated by Congress as a component of the National Wilderness Preservation System. For an area to be considered for Wilderness designation it must be roadless and possess the characteristics required by Section 2(c) of the Wilderness Act of 1964. These characteristics are: 1) naturalness - lands that are natural and primarily affected by the forces of nature; 2) roadless and having at least 5,000 acres of contiguous public lands; and 3) outstanding opportunities for solitude or a primitive and unconfined types of recreation. In addition, areas may contain "supplemental values," consisting of ecological, geological or other features of scientific, educational, scenic or historical importance.

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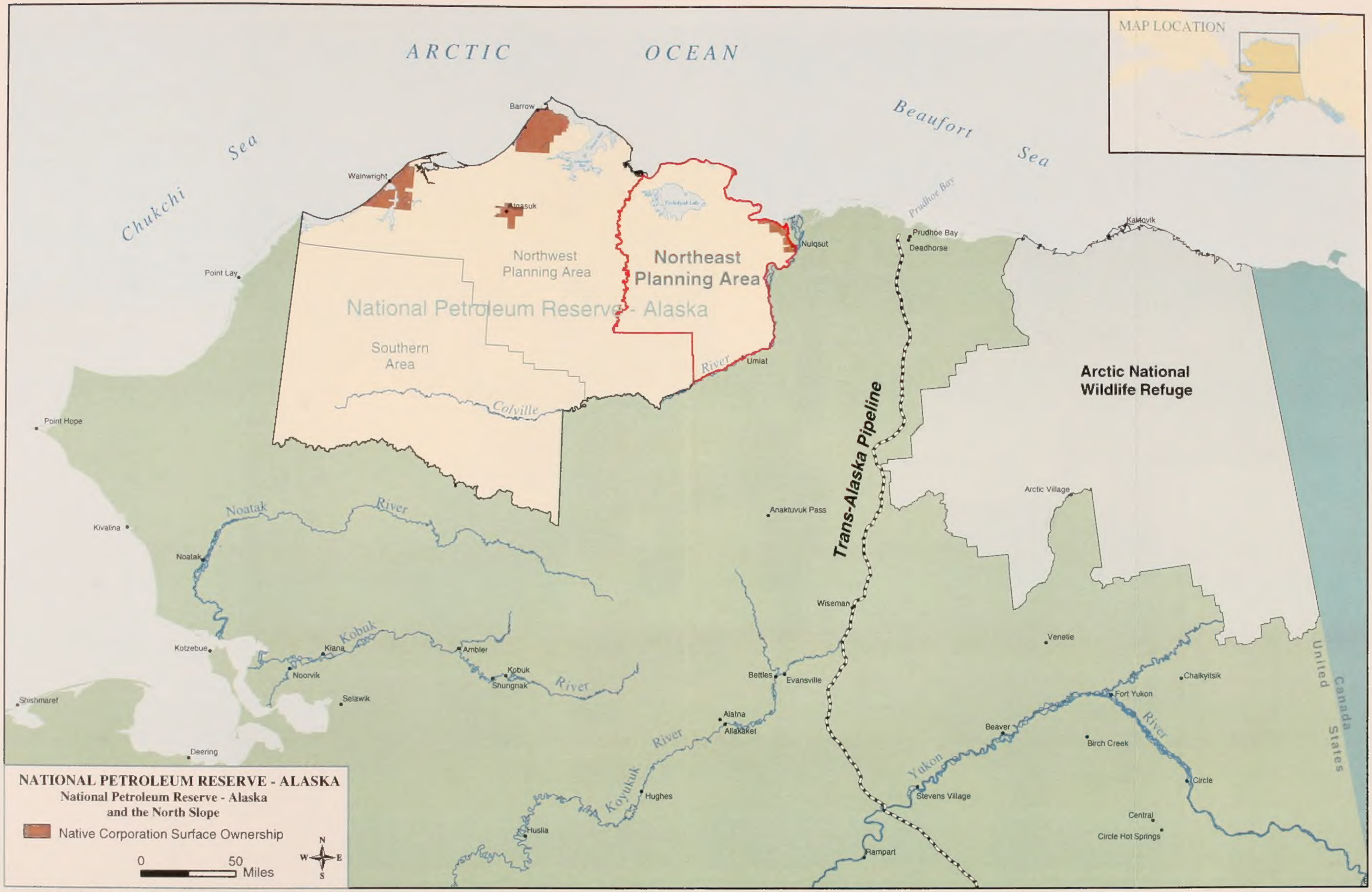


Source: USDOI BLM and MMS 2003

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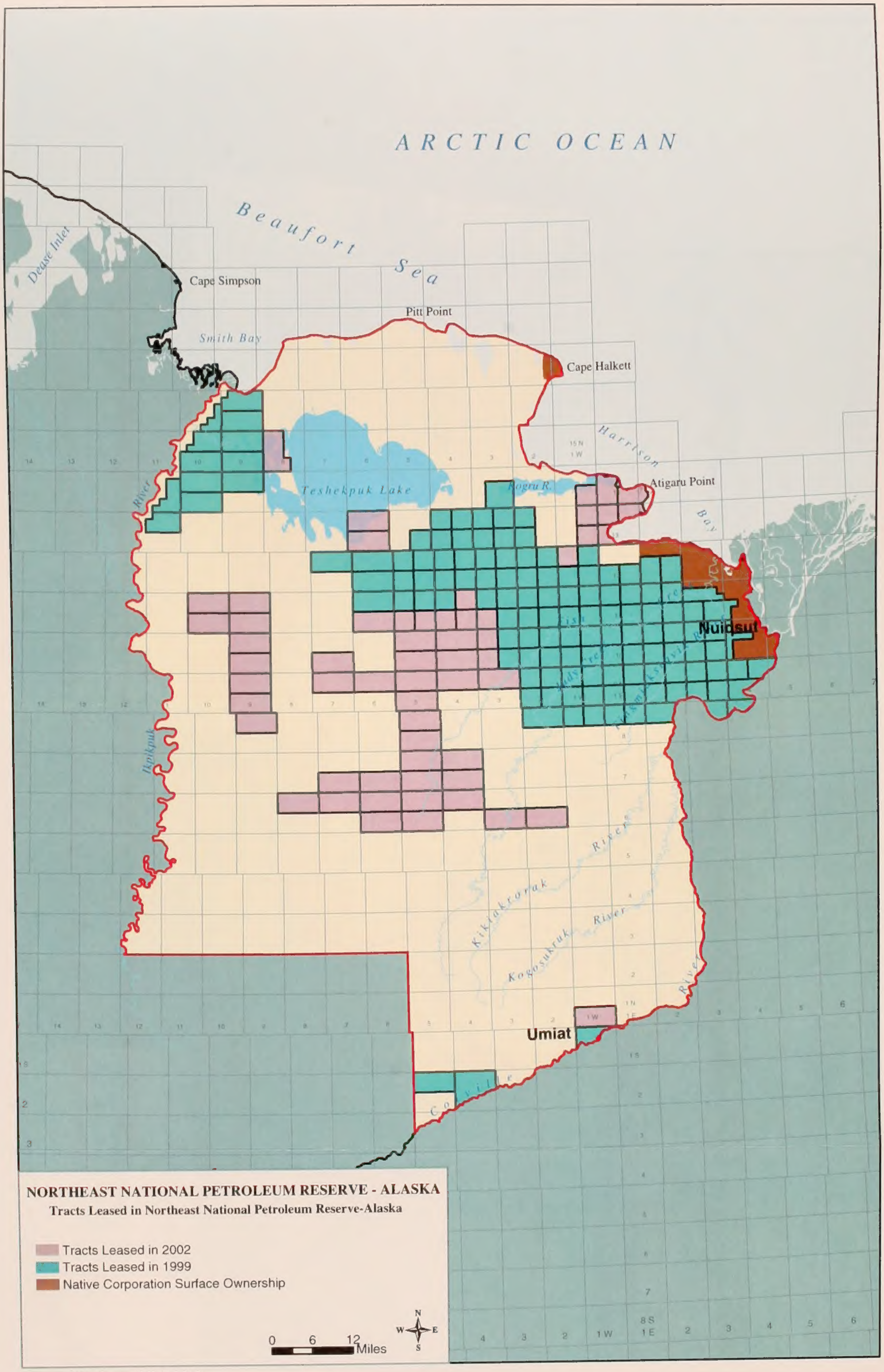


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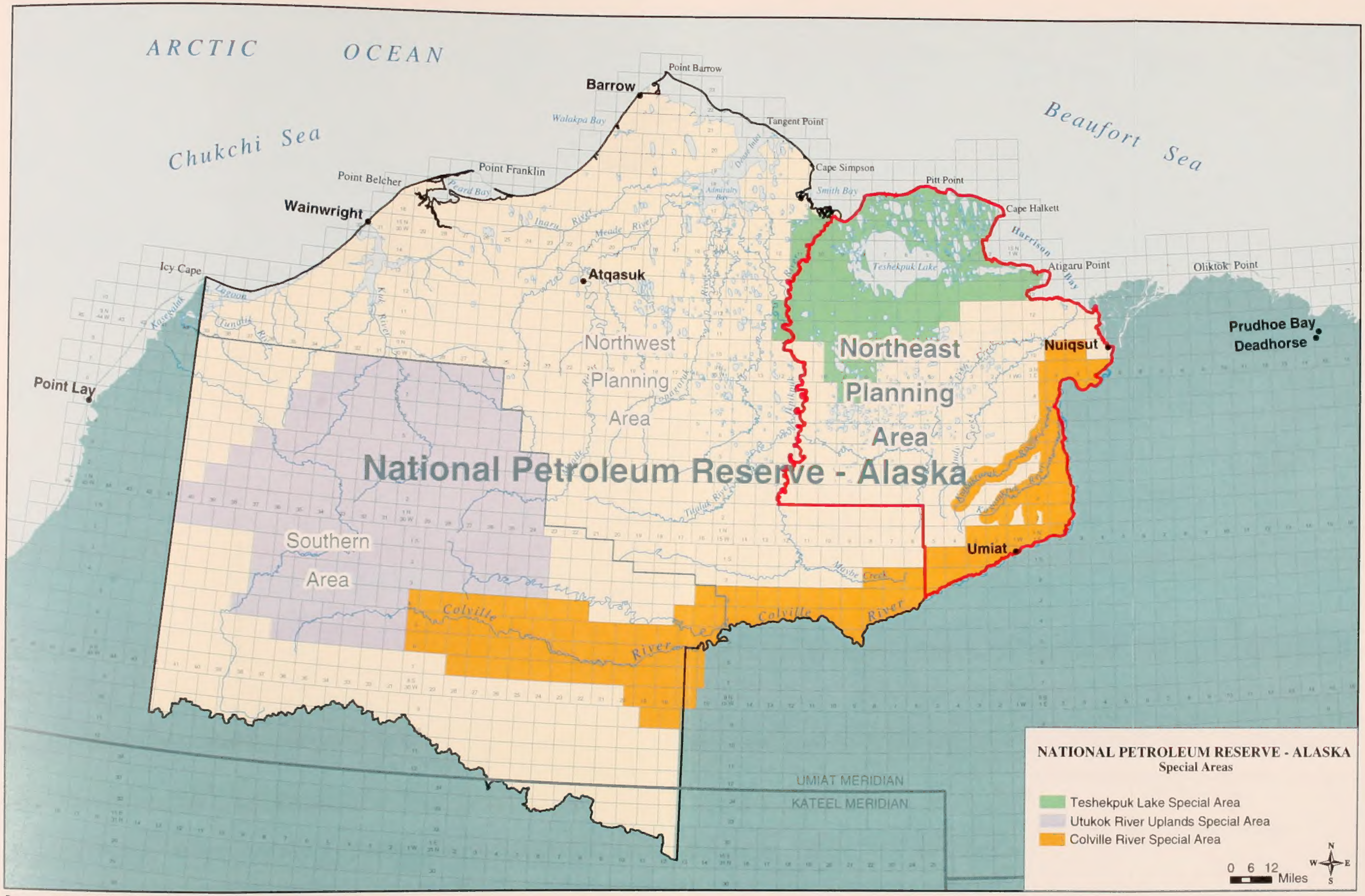

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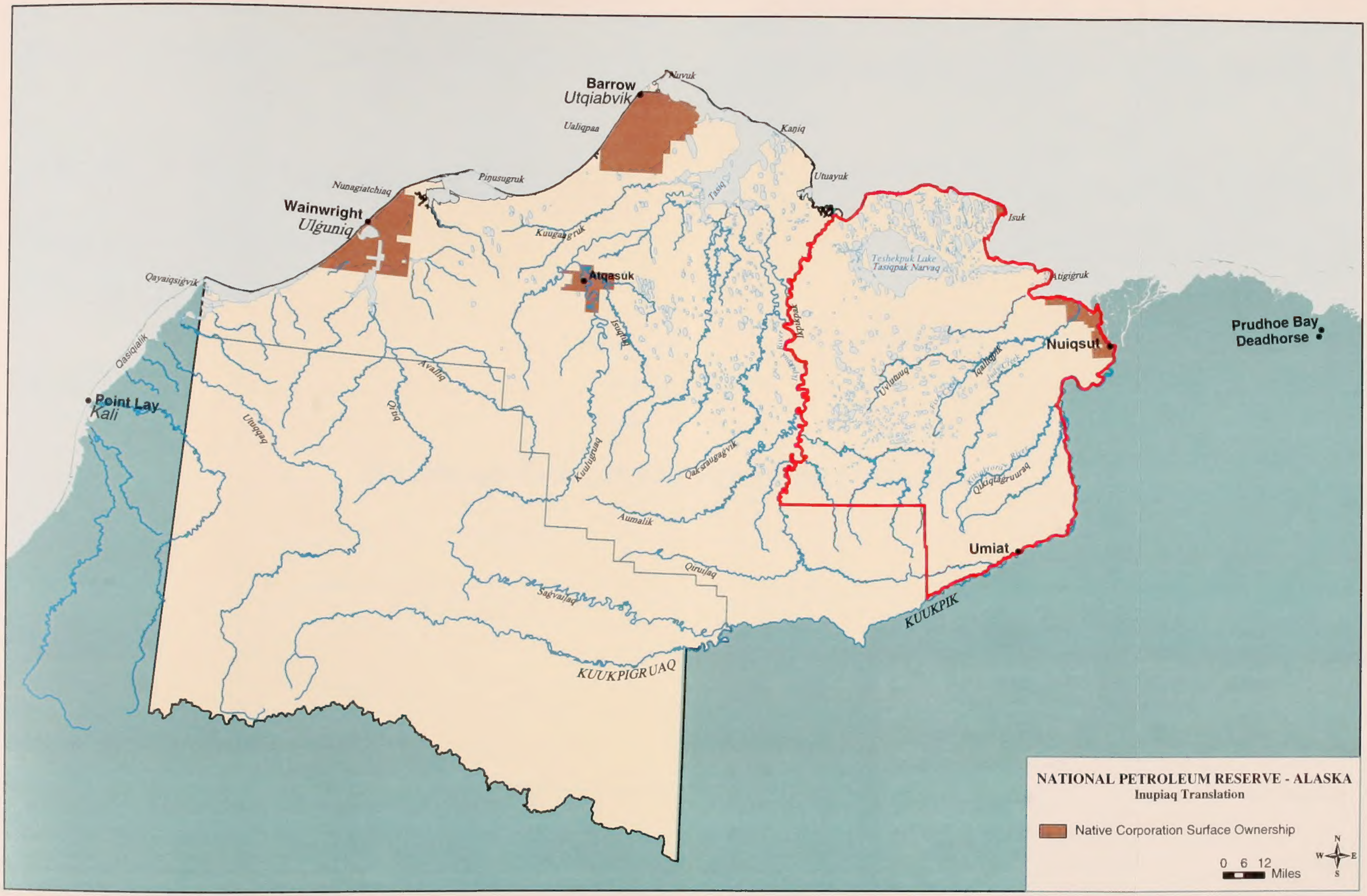


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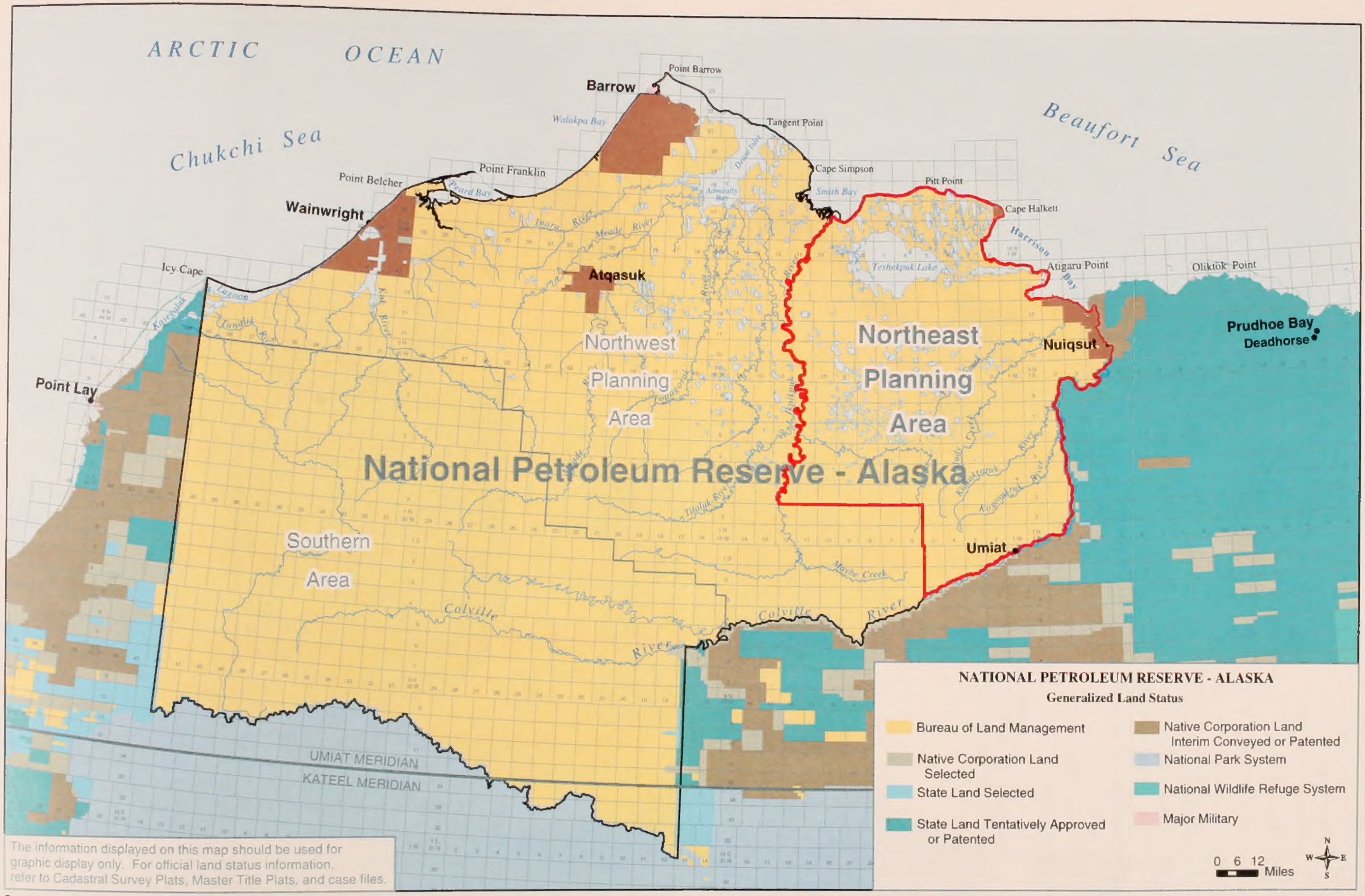


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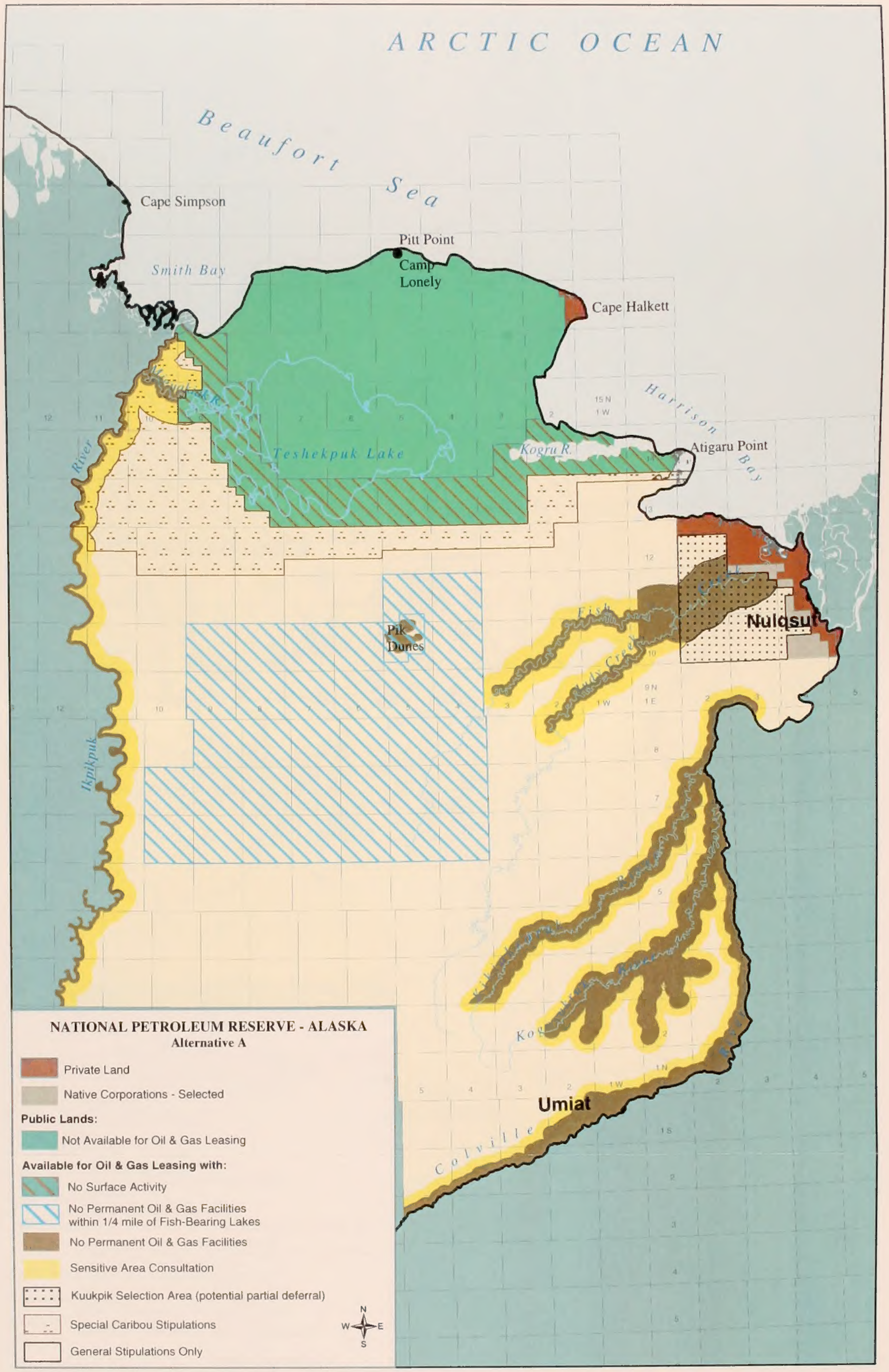


Source: USDOI BLM MMS 2003

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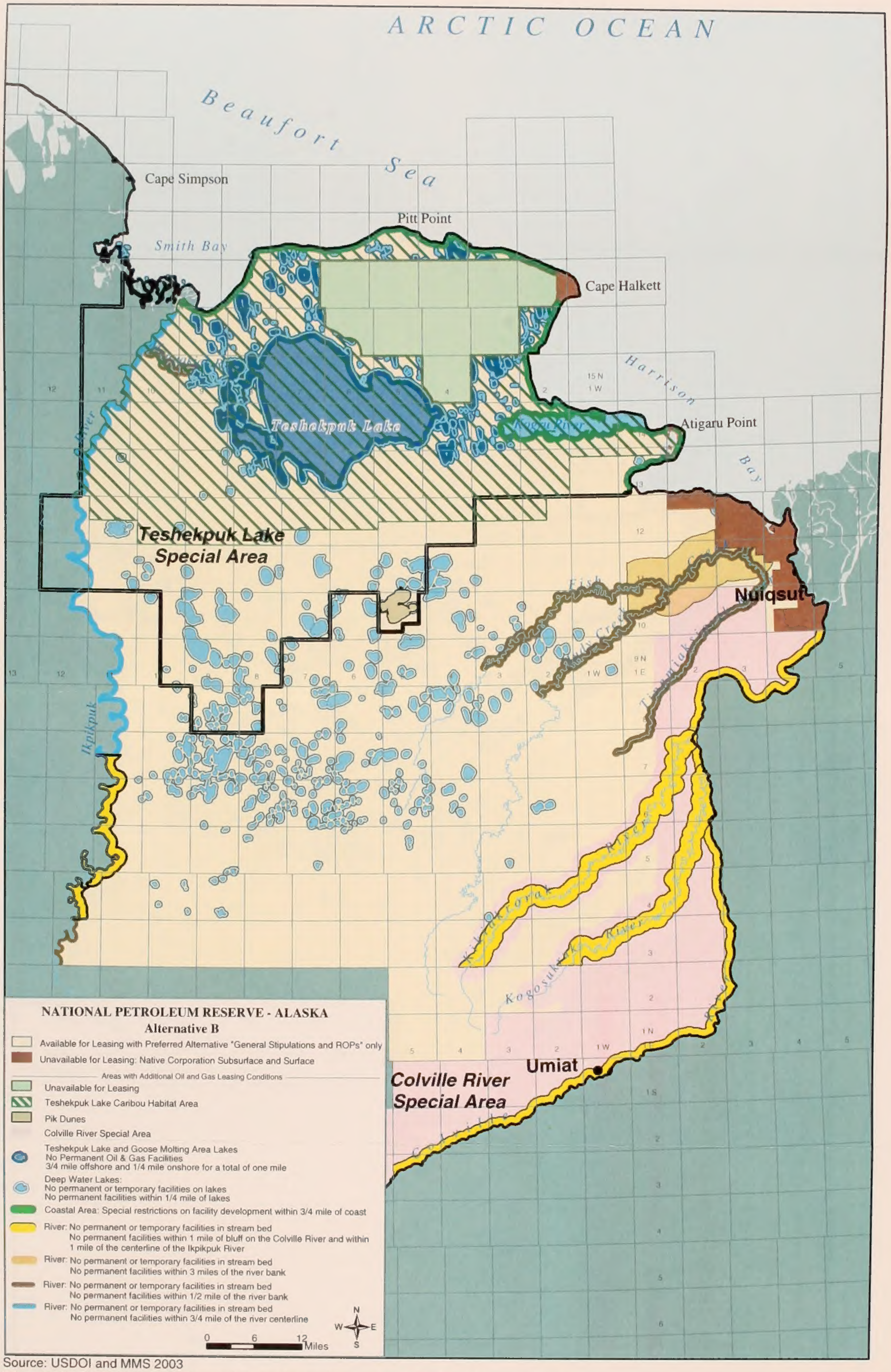


Source: USDOI and MMS 2003

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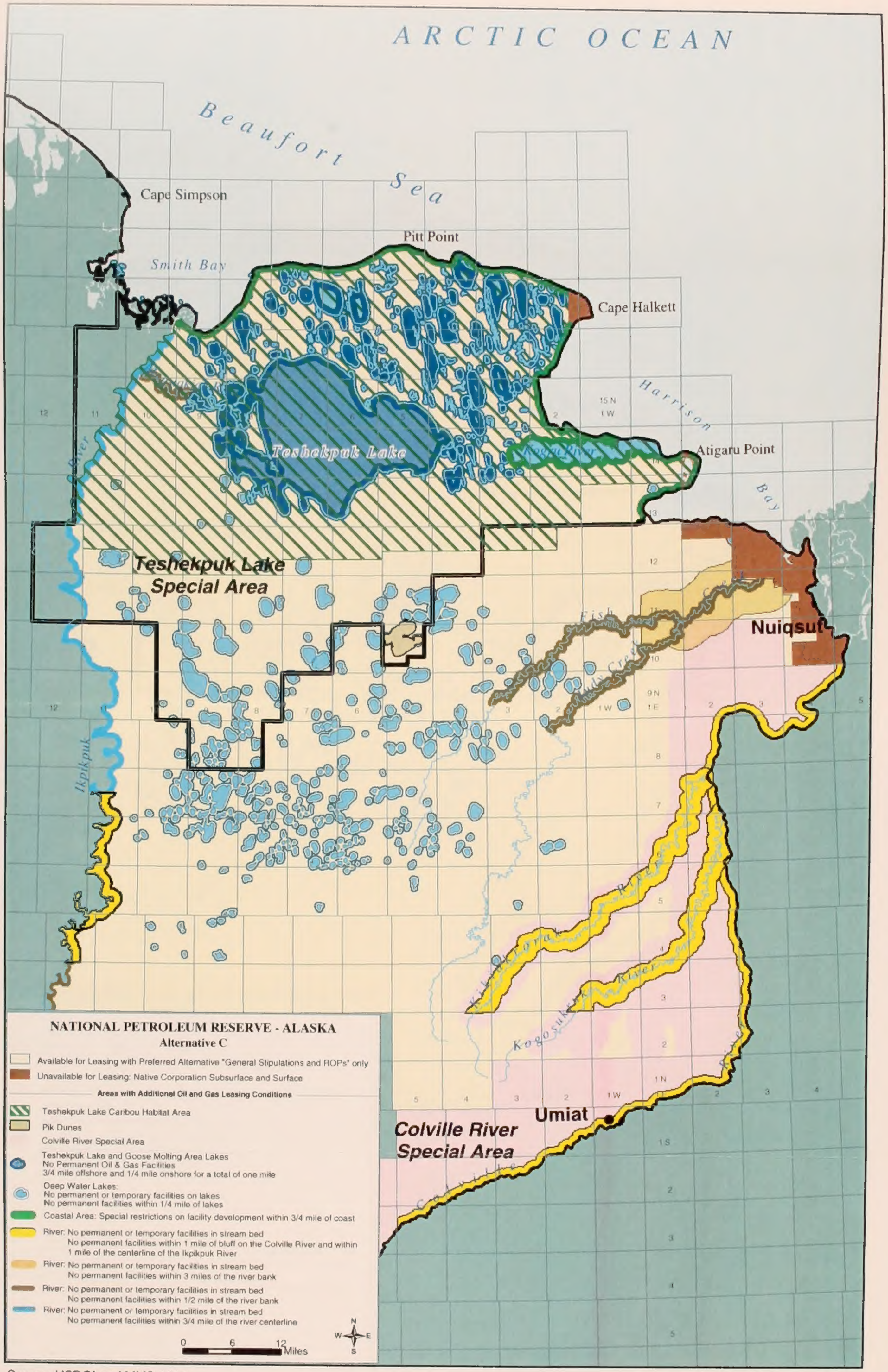


Source: USDOI and MMS 2003

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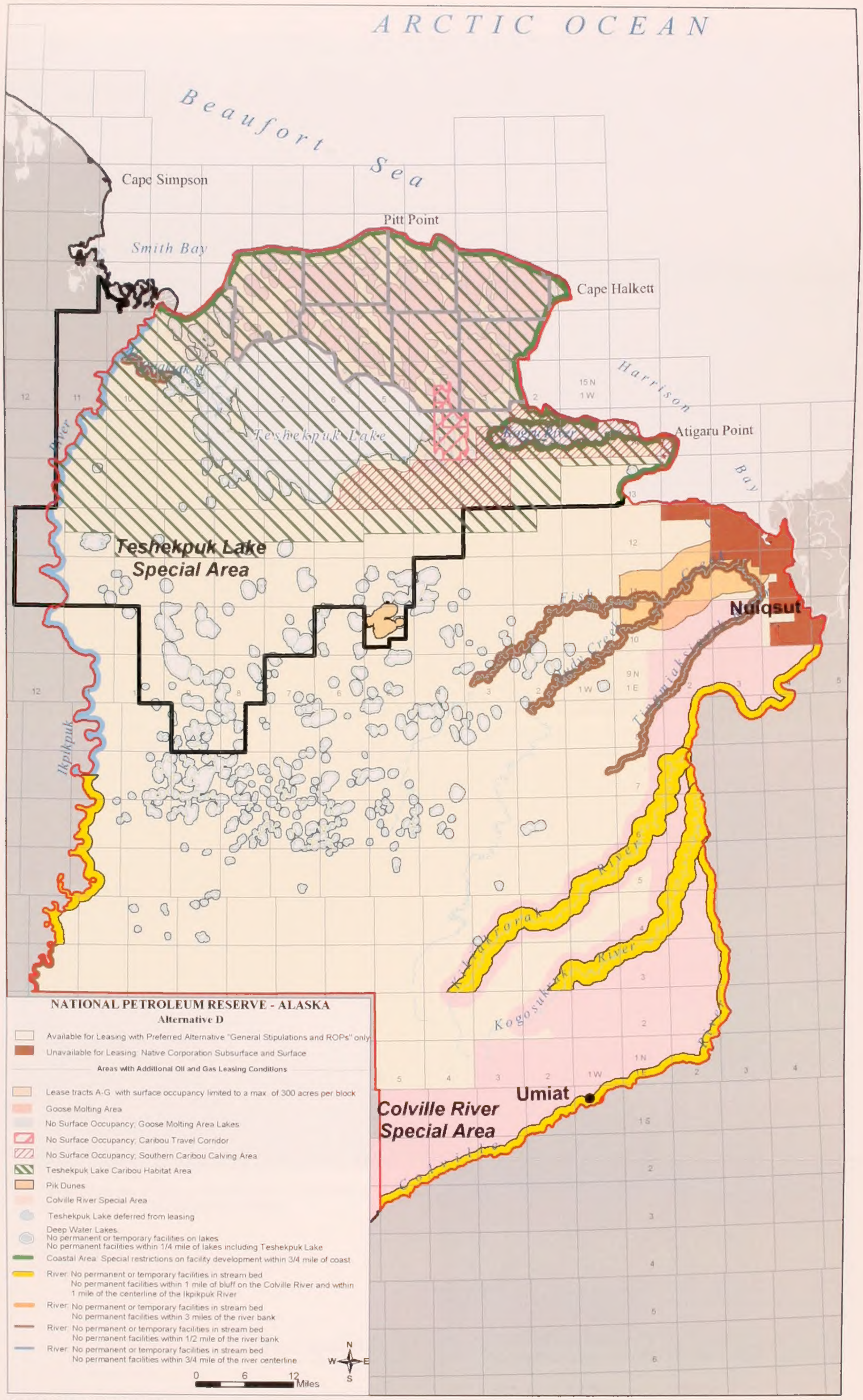


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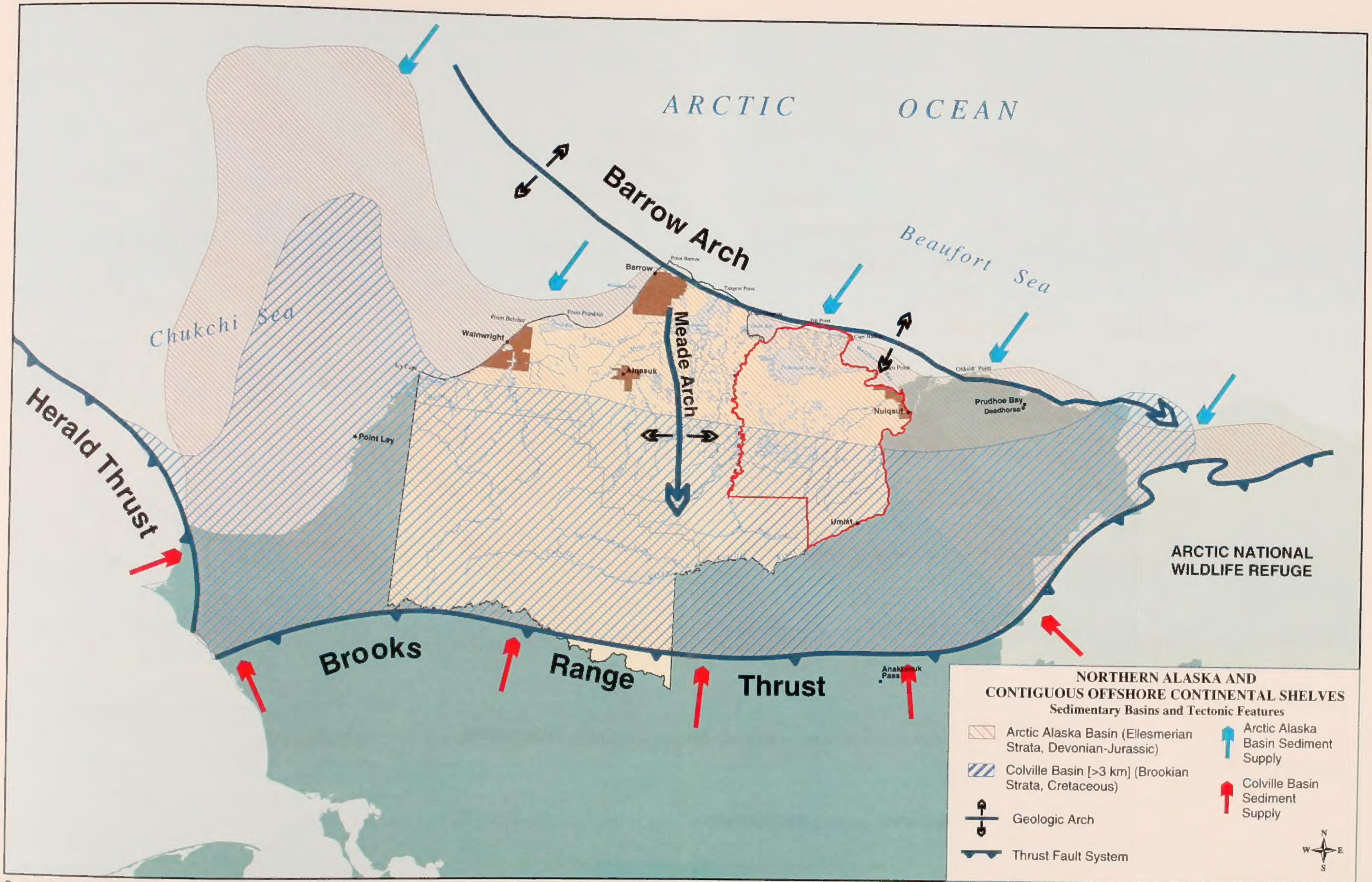


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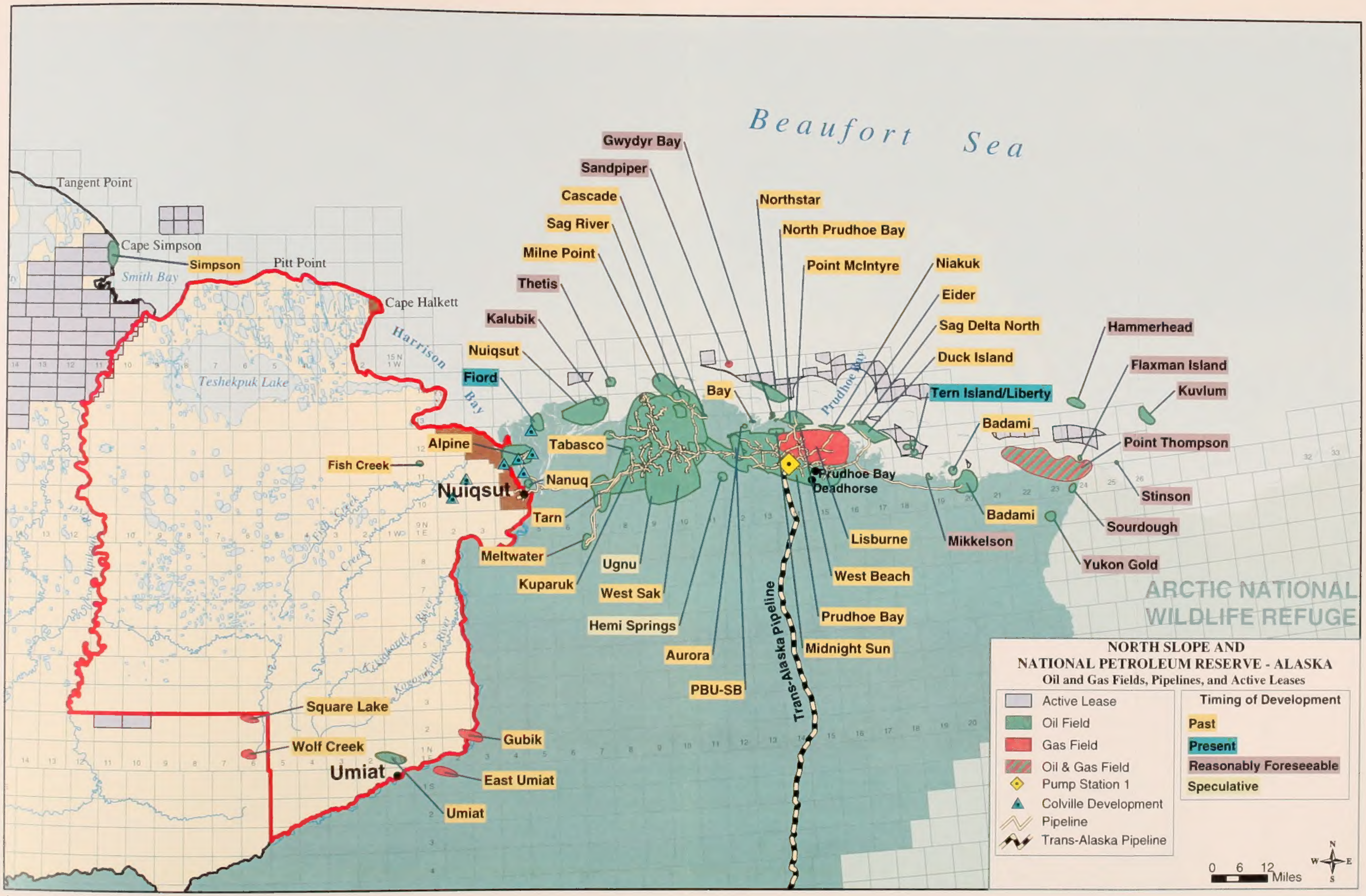


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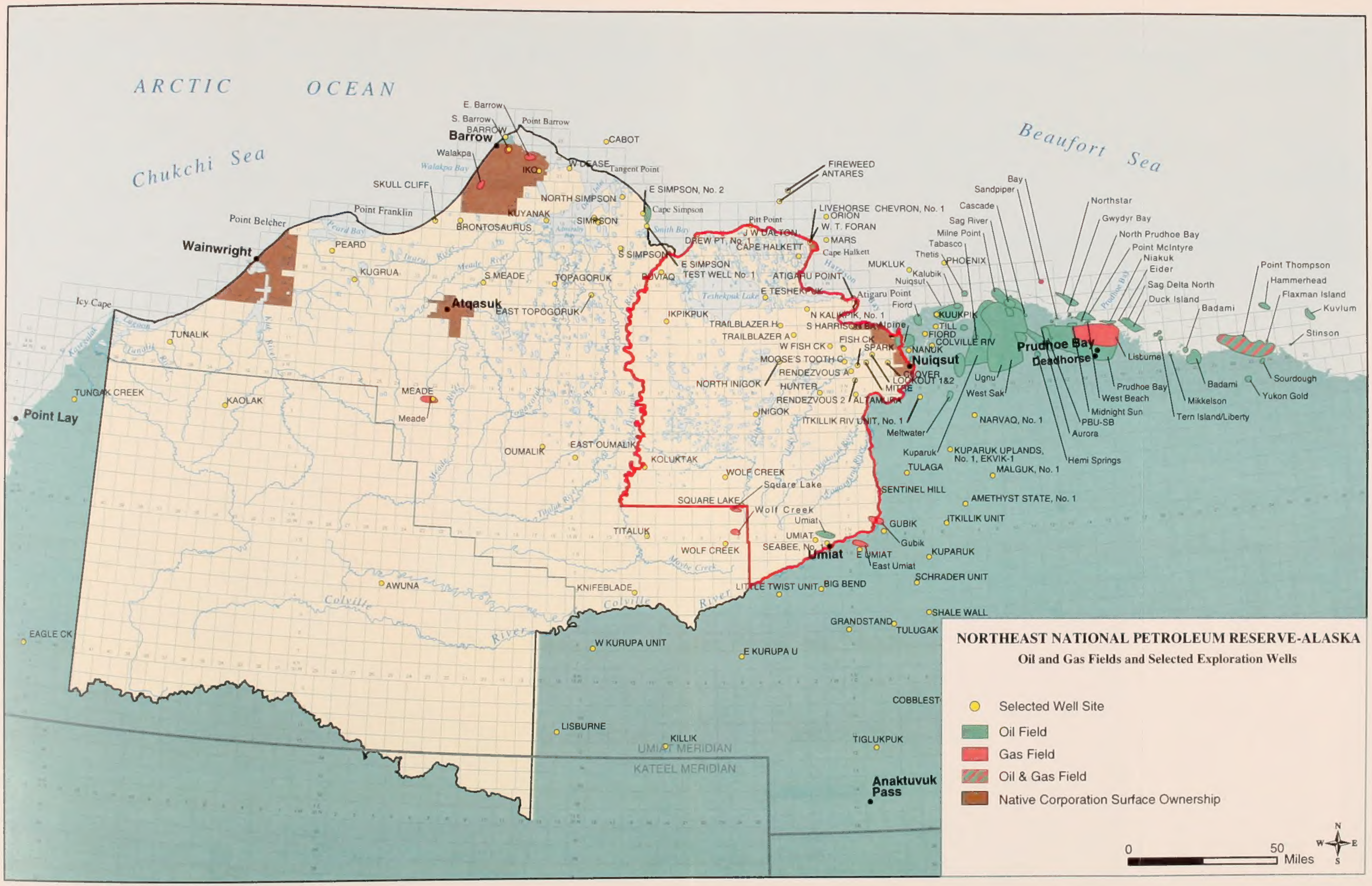


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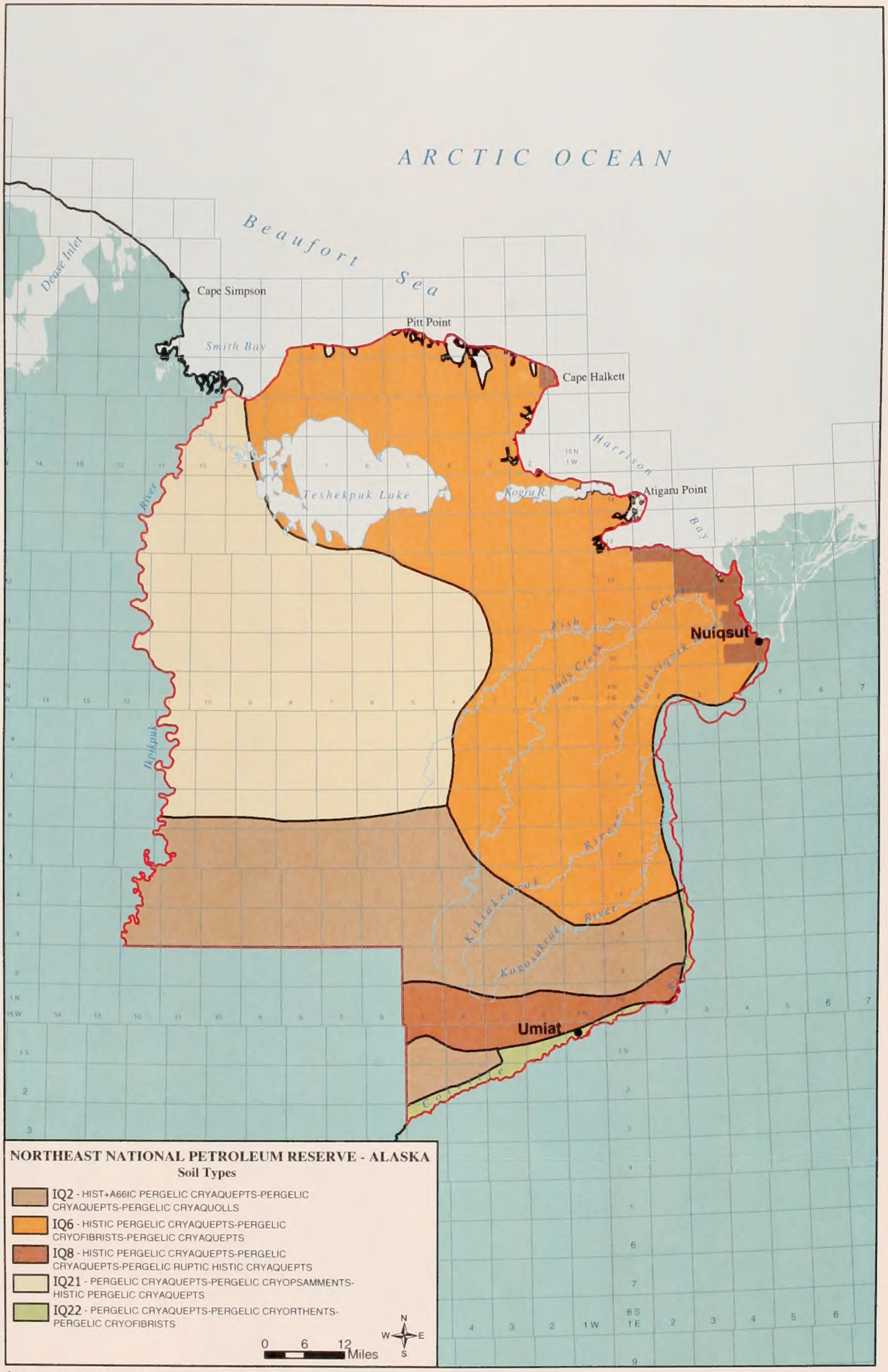


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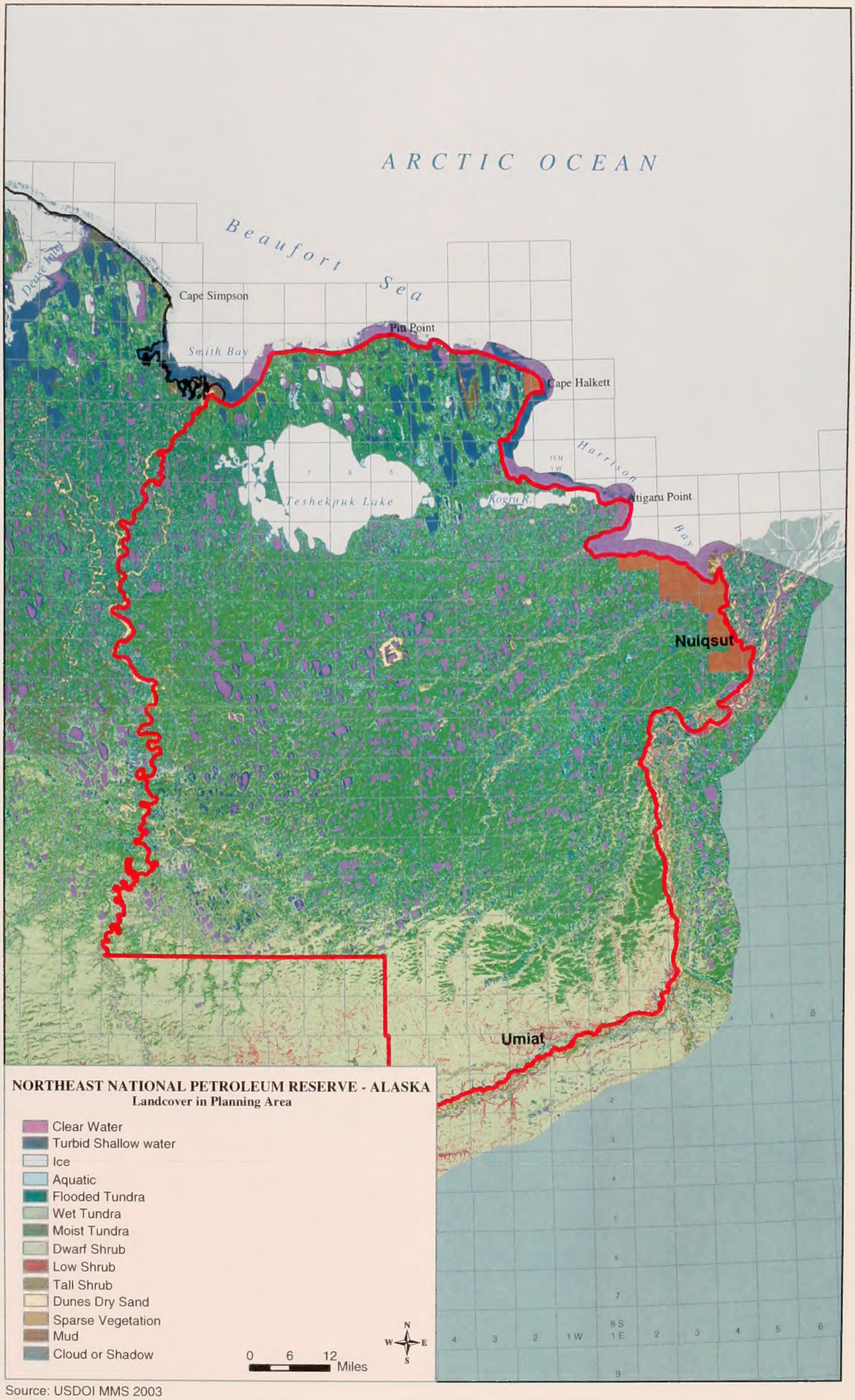


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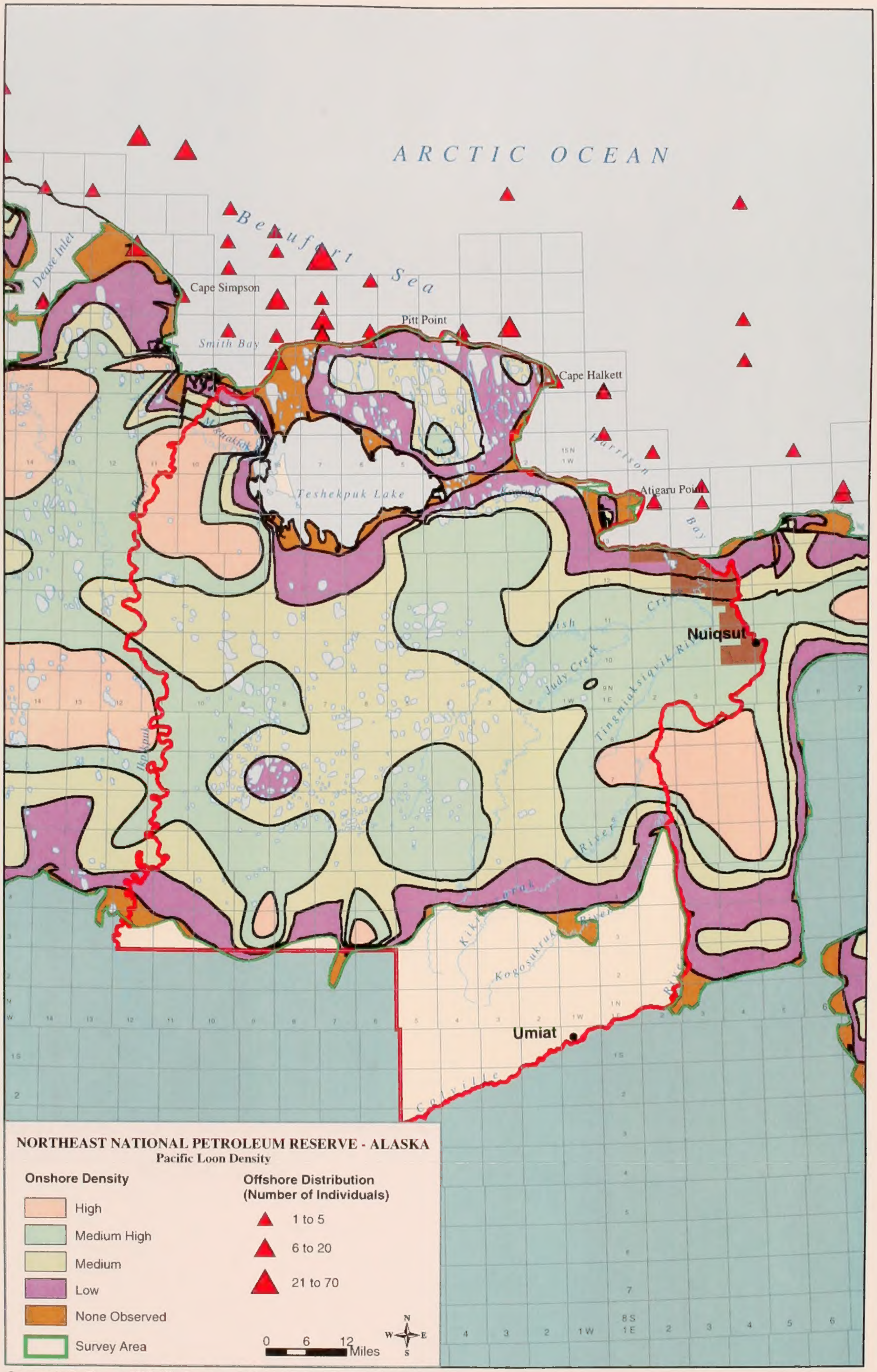


Source: U.S. Fish and Wildlife Service 2002 Aerial Breeding Pair Surveys

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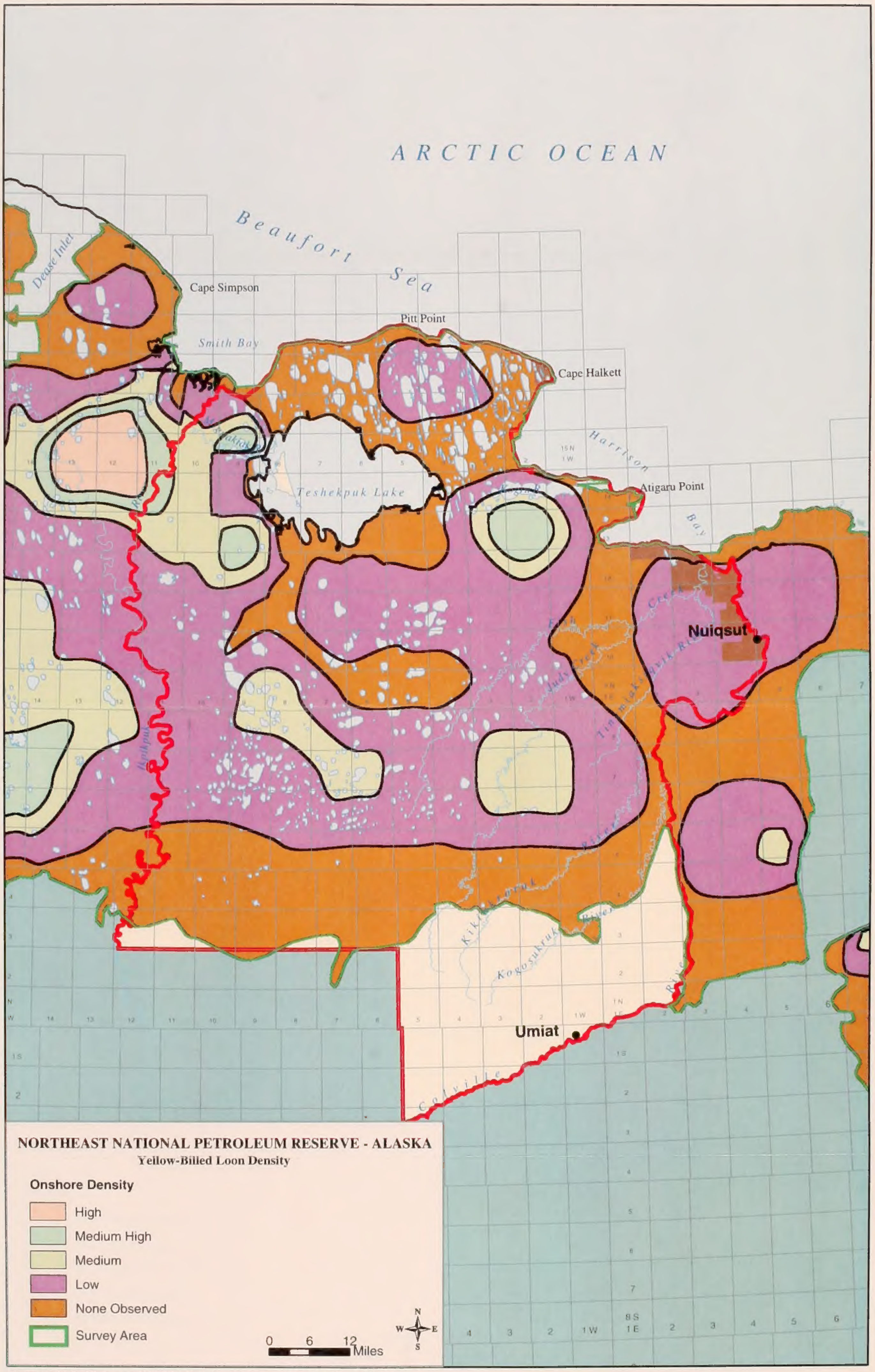


Source: U.S. Fish and Wildlife Service 2002 Aerial Breeding Pair Surveys

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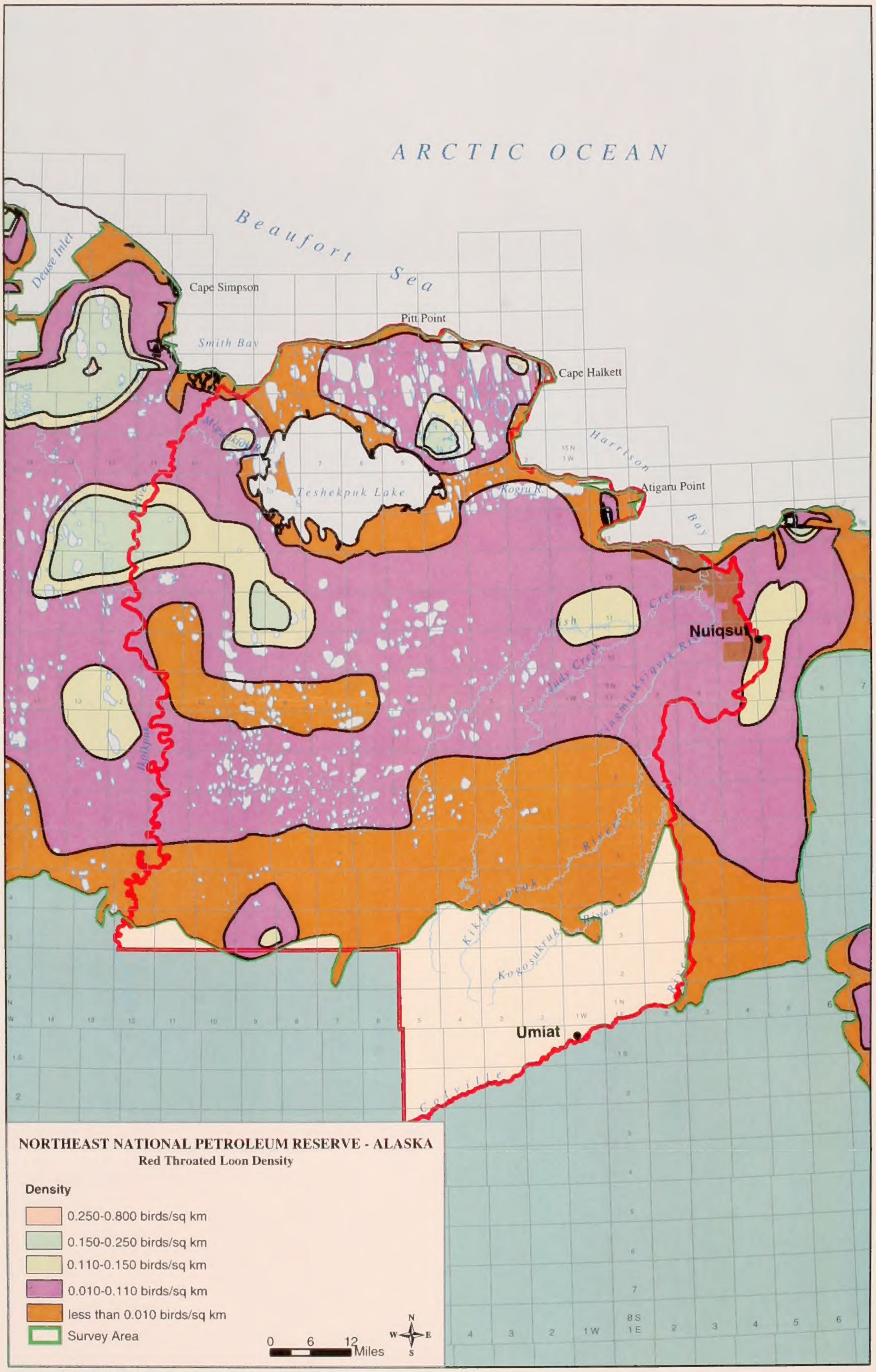


Source: Mallek et al. 2002

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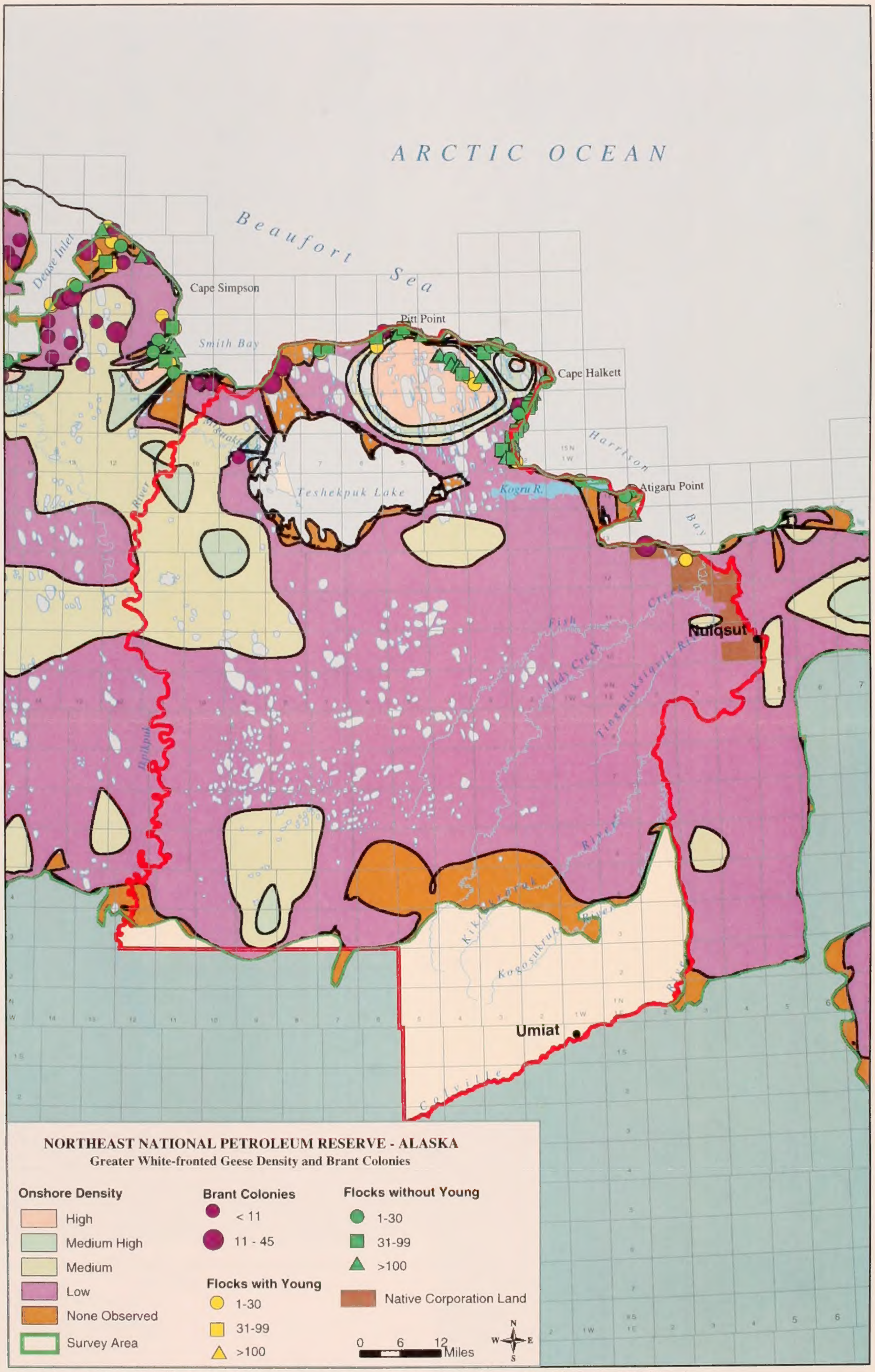


Source: U.S. Fish and Wildlife Service 2002 Breeding Pair Surveys (White-fronted Geese) and ABR, Inc. 2002 (Brant)

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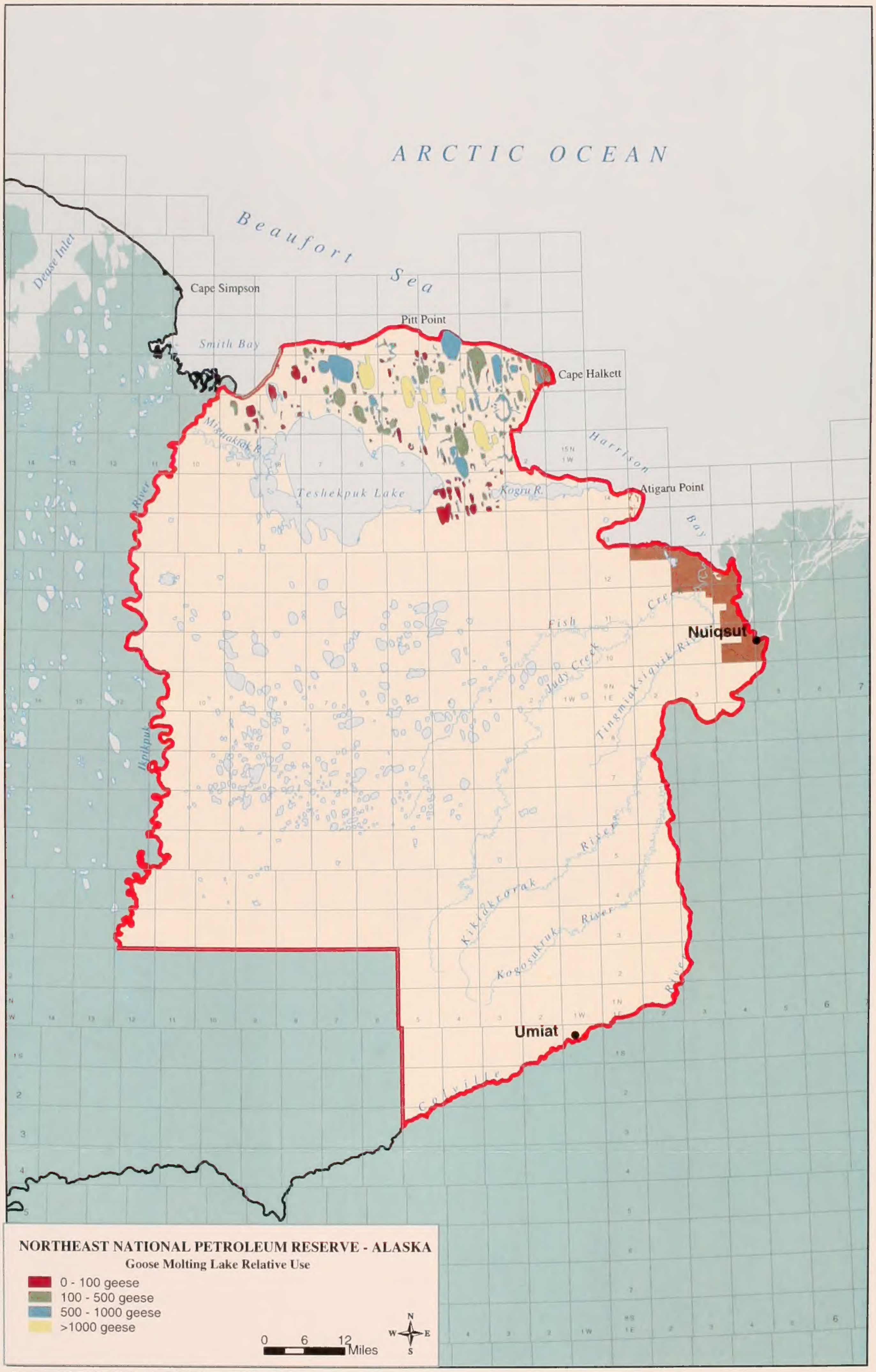


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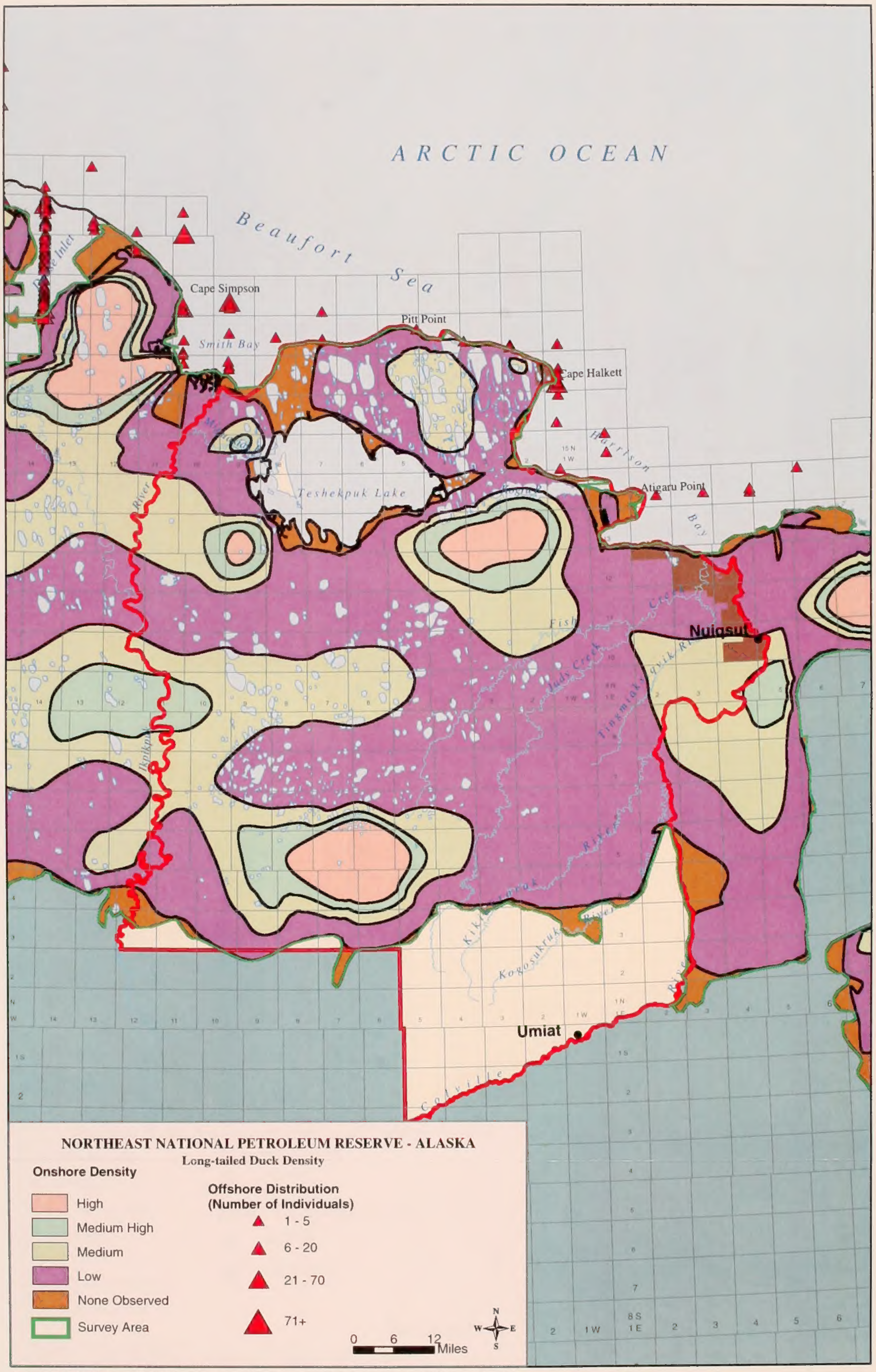


Source: U.S. Fish and Wildlife Service 2002 Breeding Pair Surveys and Offshore Survey

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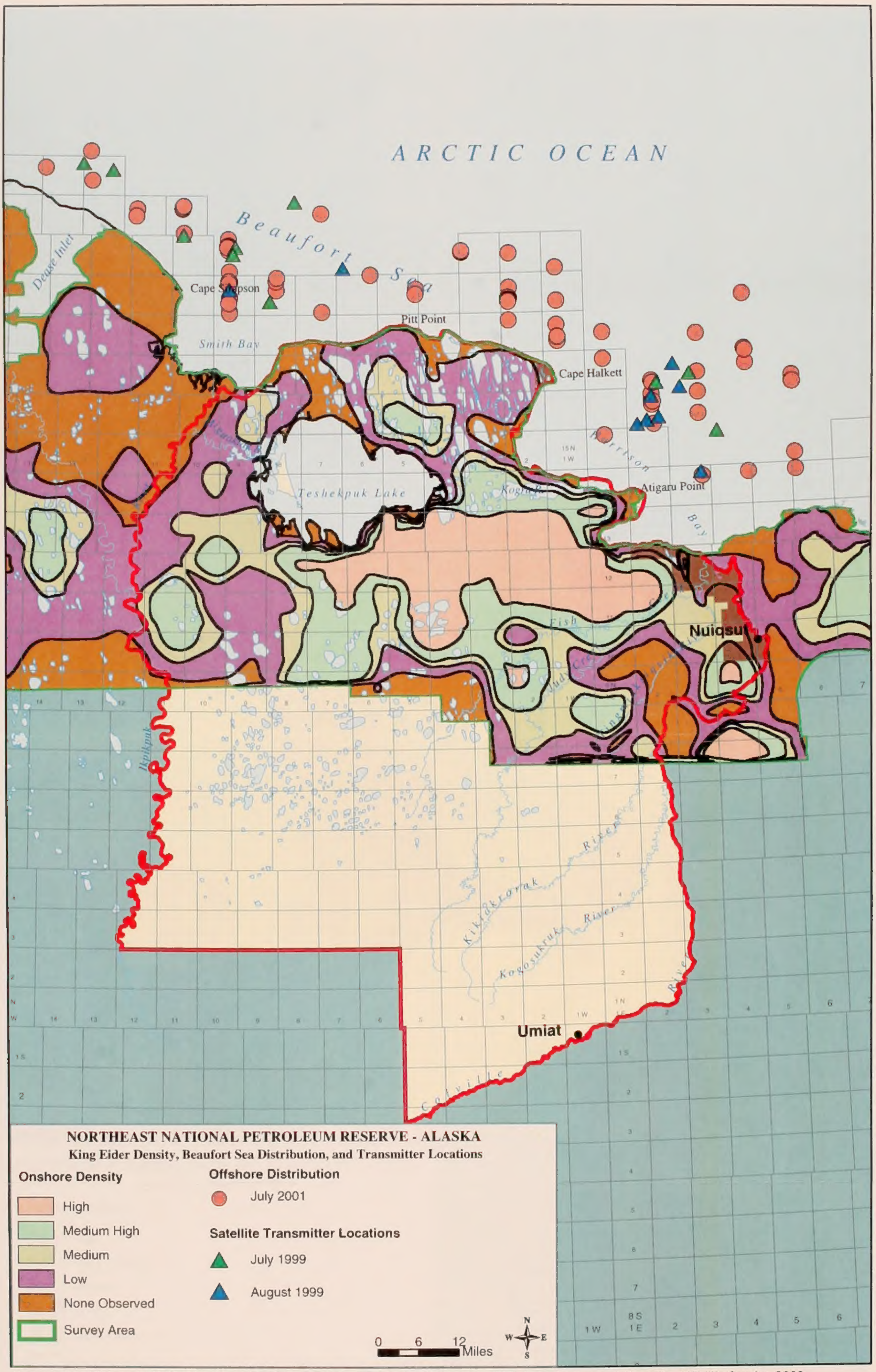


Source: U.S. Fish and Wildlife Service 2002 Eider Breeding Population Surveys and Offshore Survey and Canadian Wildlife Service 2002 (Transmitter Locations)

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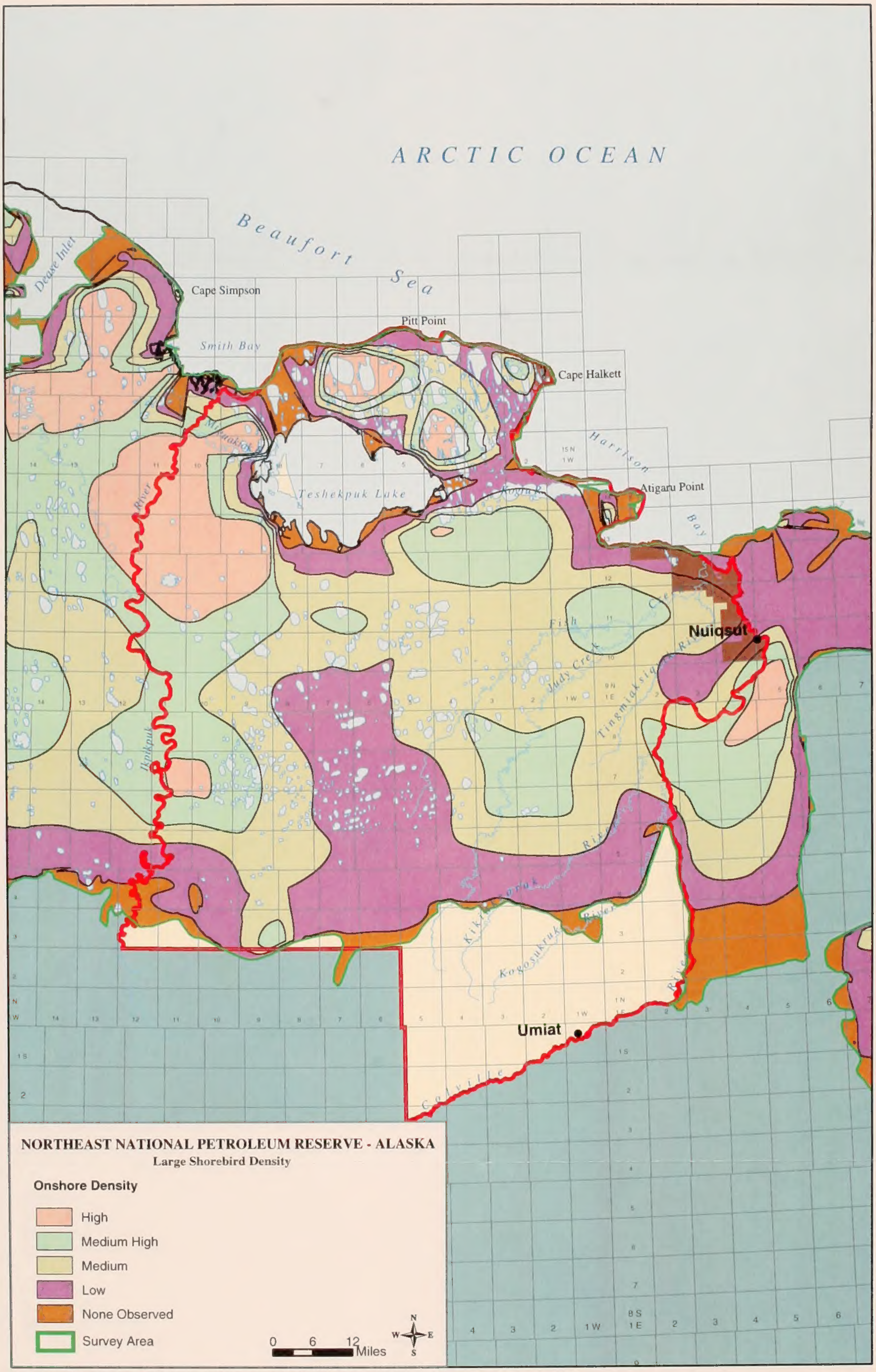


Source: U.S. Fish and Wildlife Service 2002 Breeding Pair Surveys

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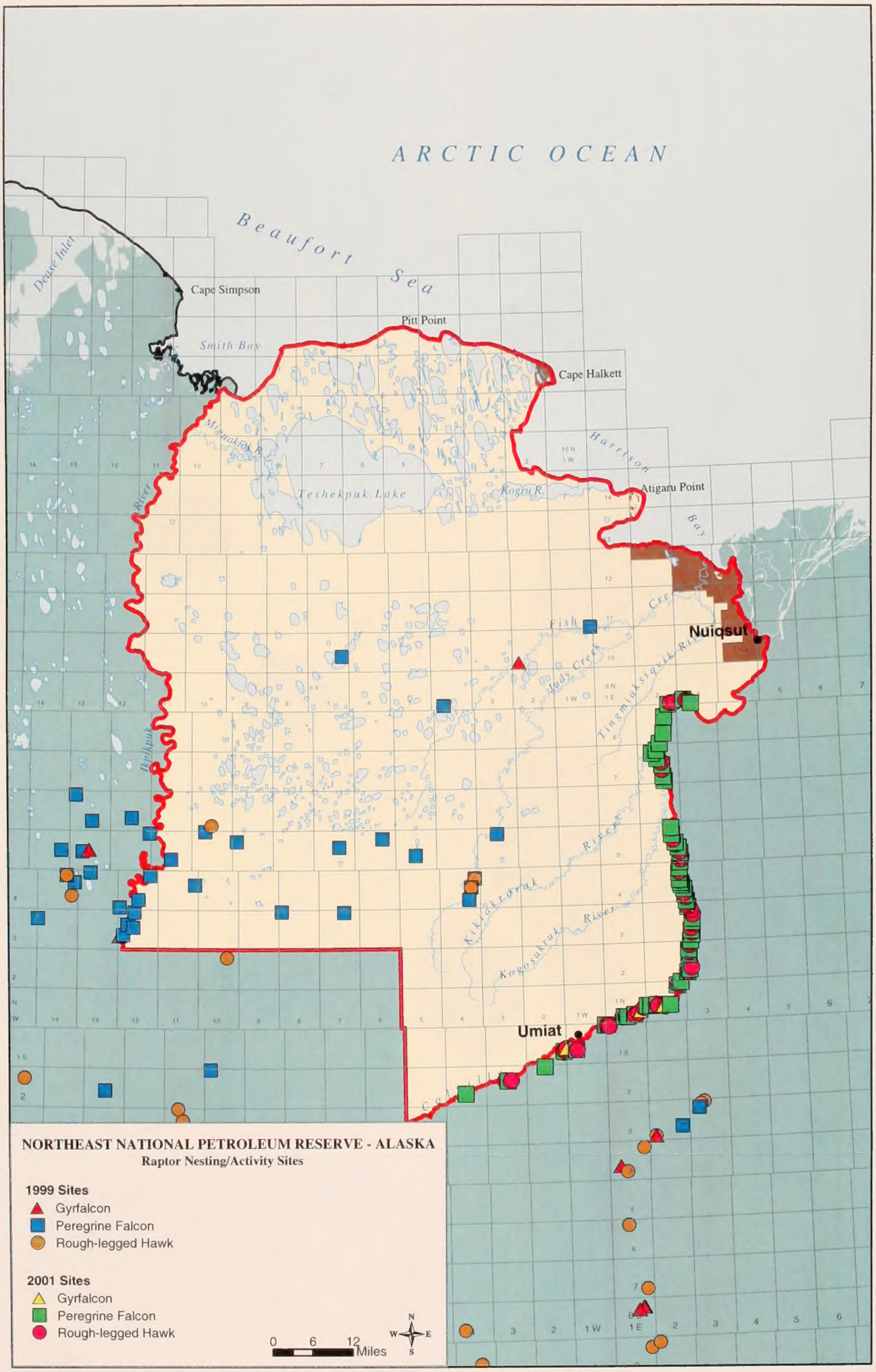


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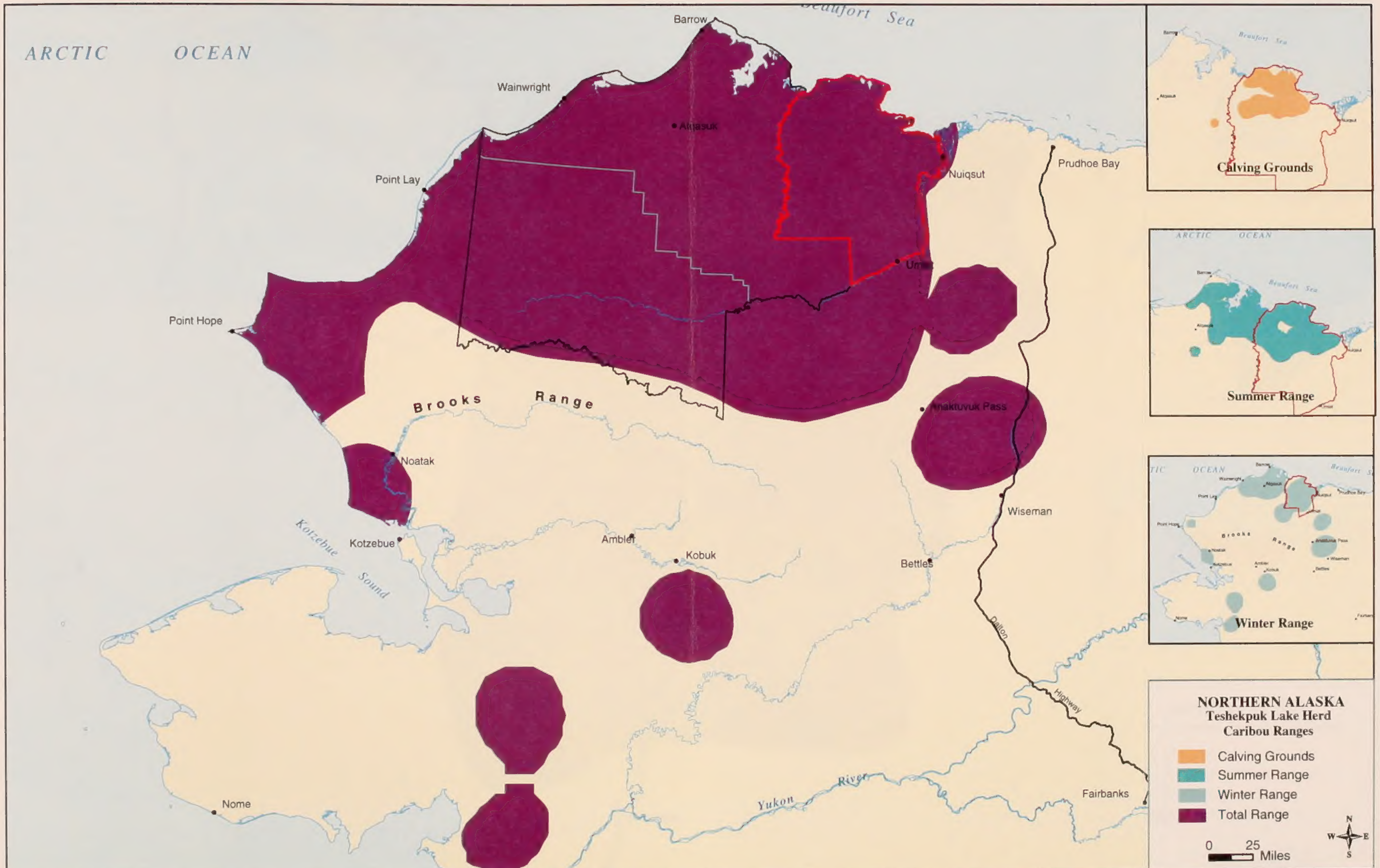


Source: Alaska Department of Fish and Game Pritchard et.al. 2001

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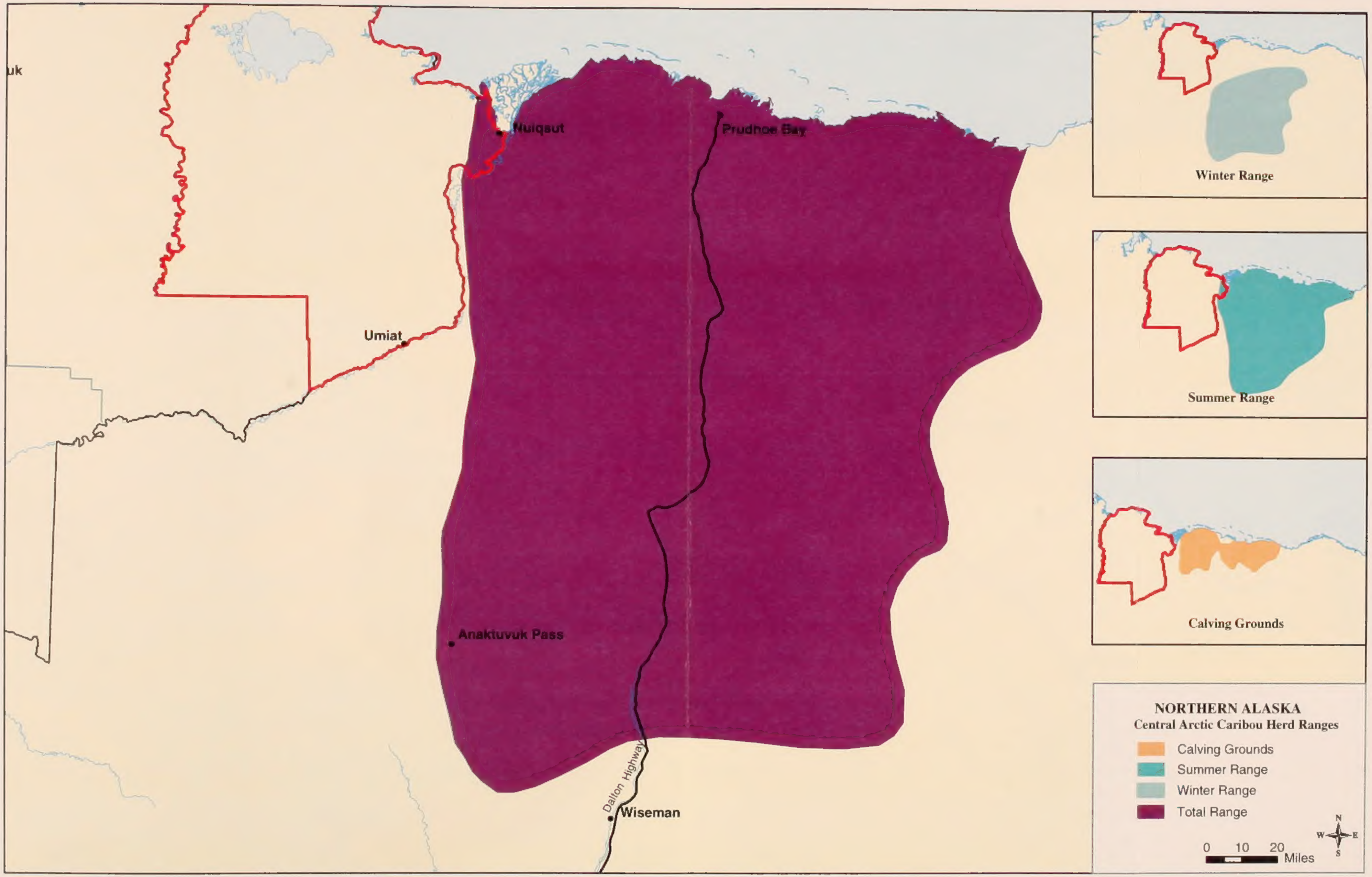


Source: Alaska Department of Fish and Game Pritchard et al. 2001

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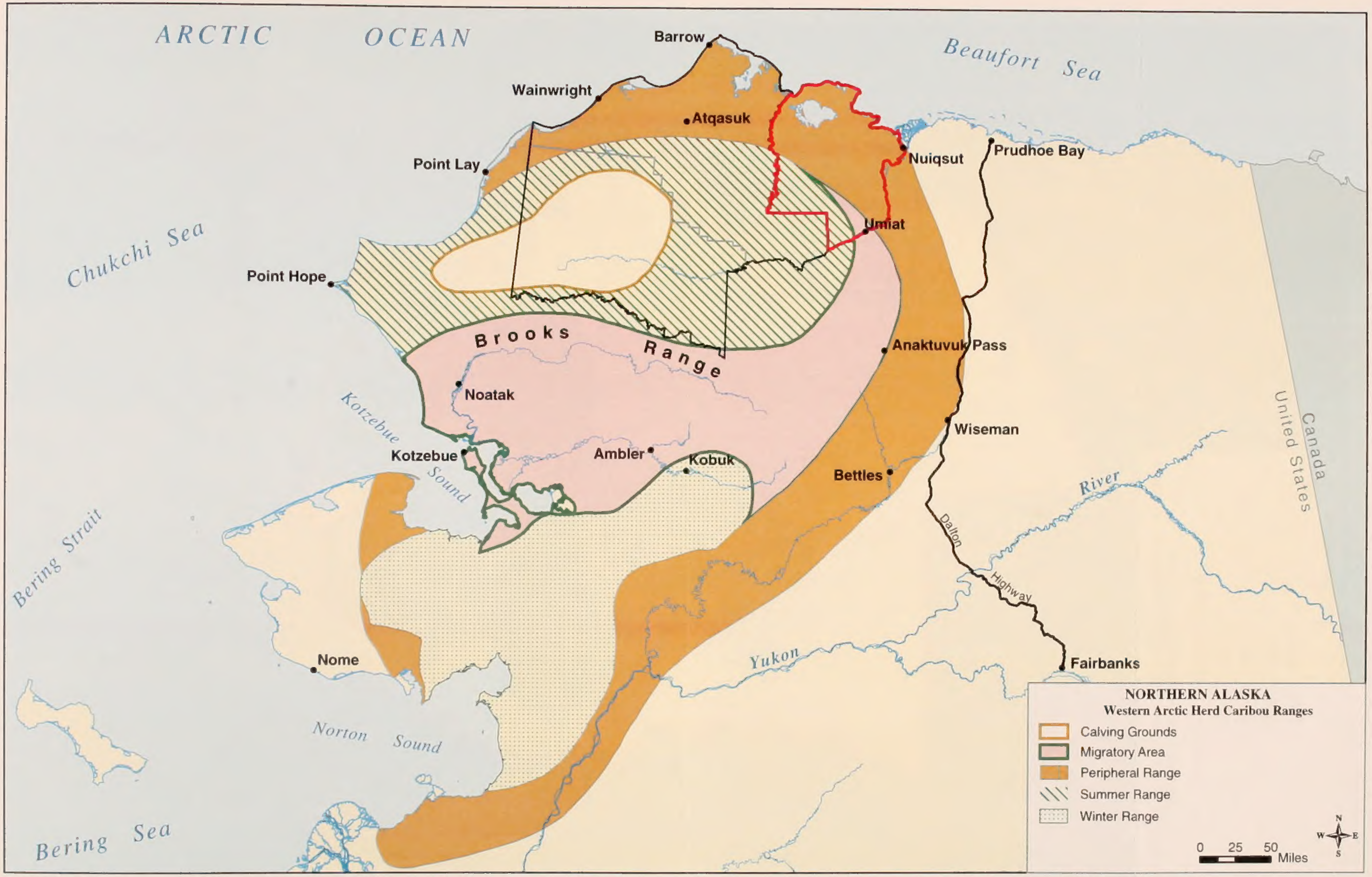


Source: Alaska Department of Fish and Game Pritchard et al. 2001

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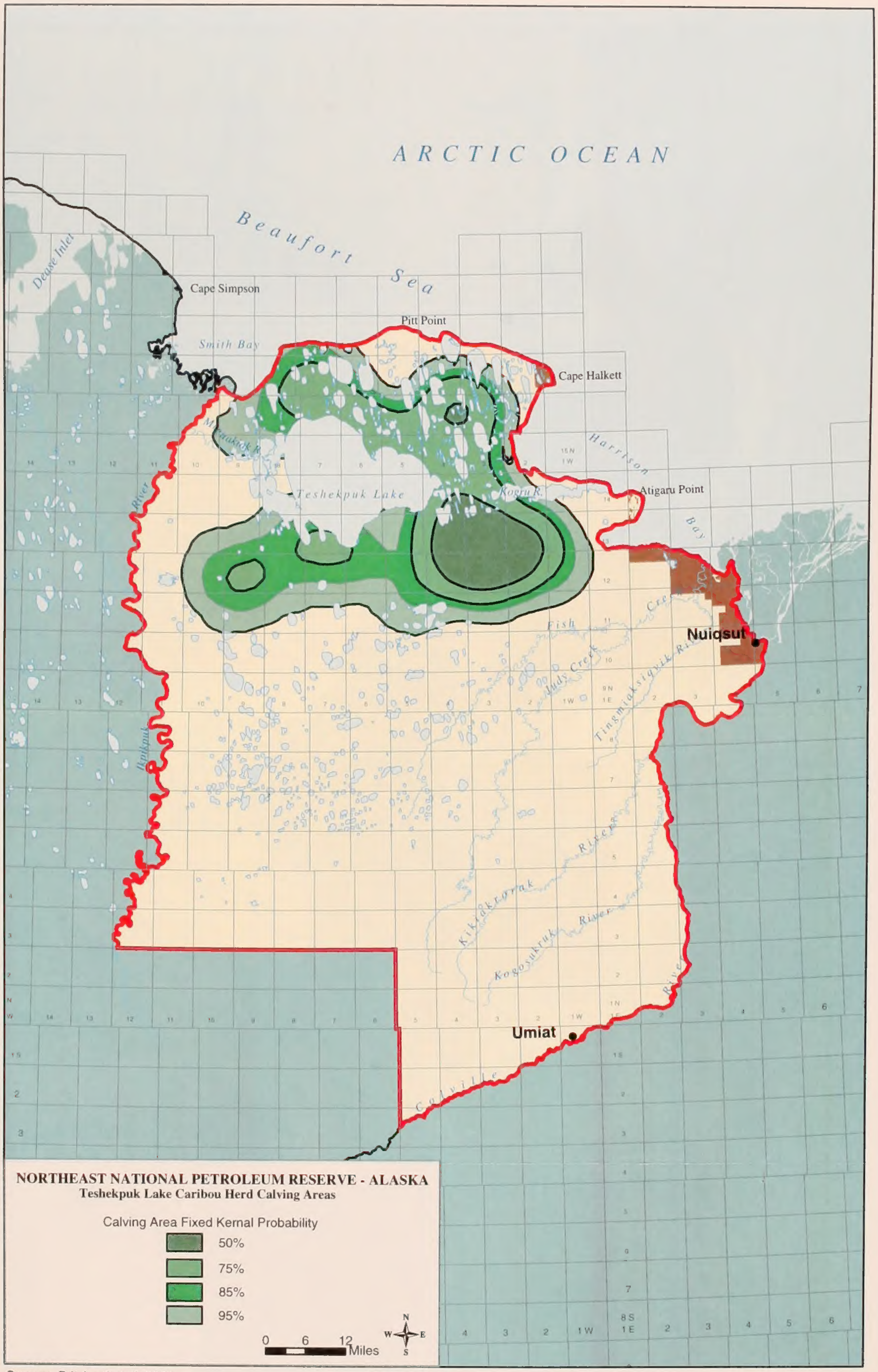


Source: Pritchard et al. 2001

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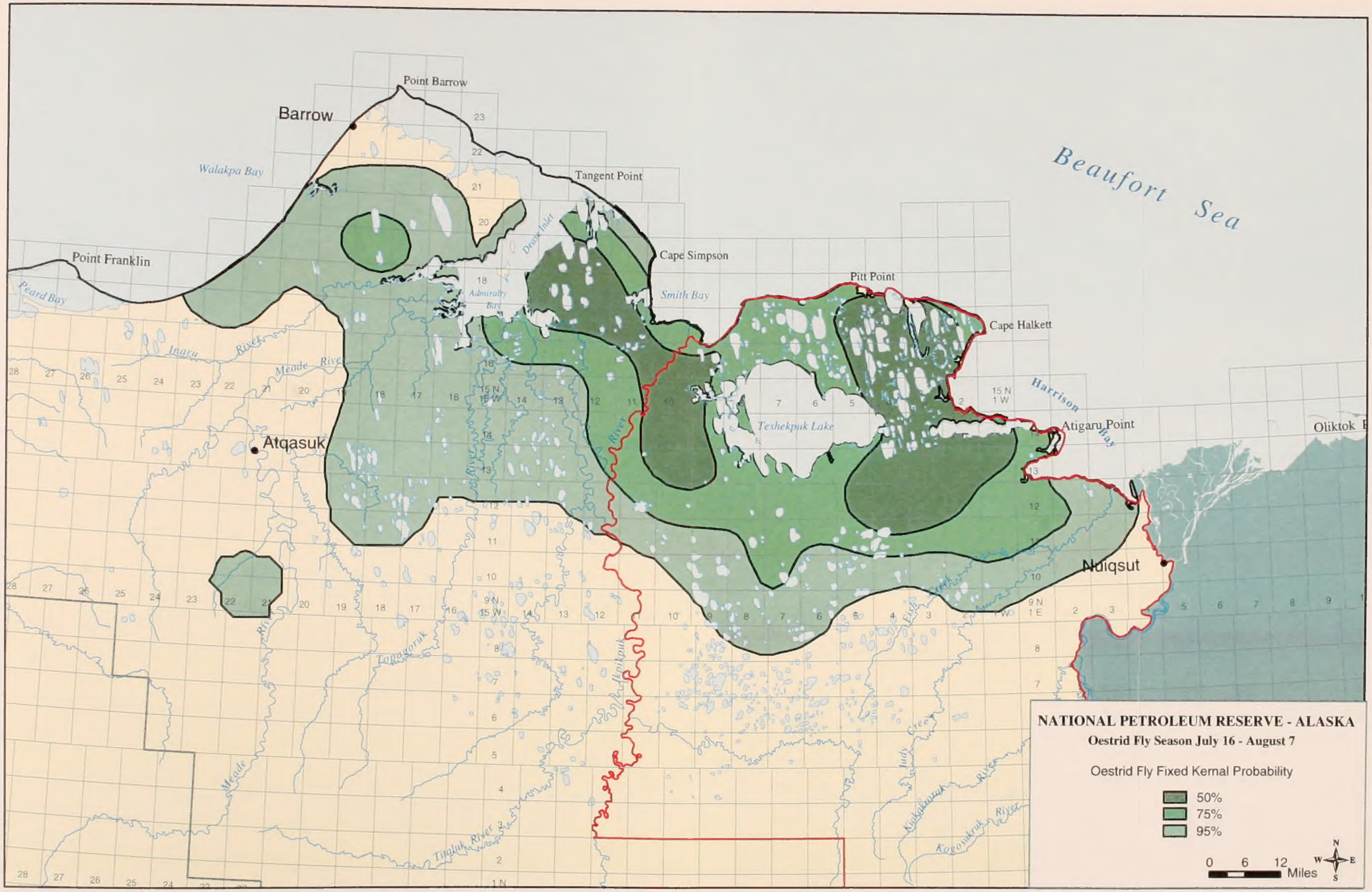

Source: Pritchard et al. 2001

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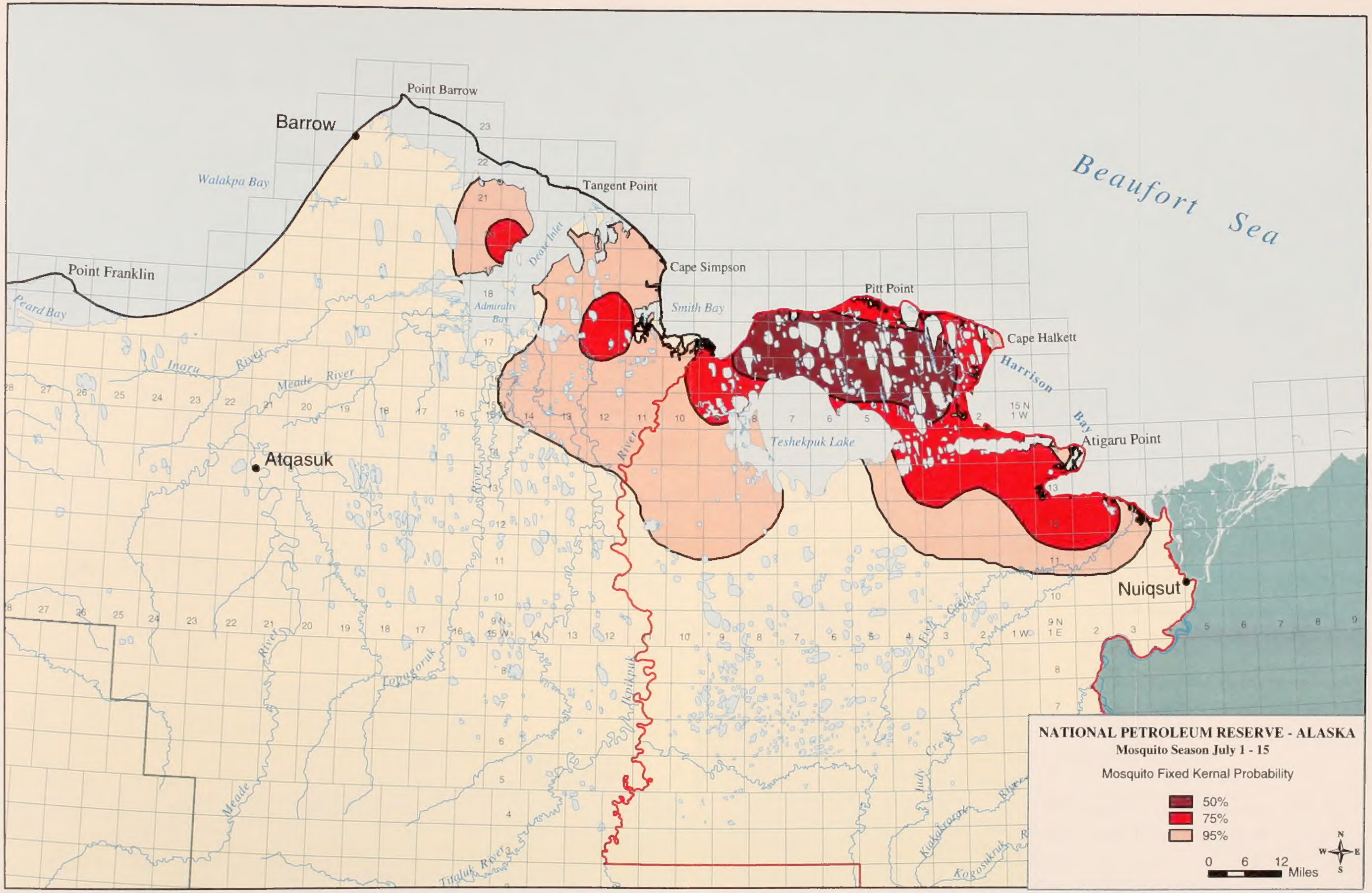


Source: Pritchard et al. 2001

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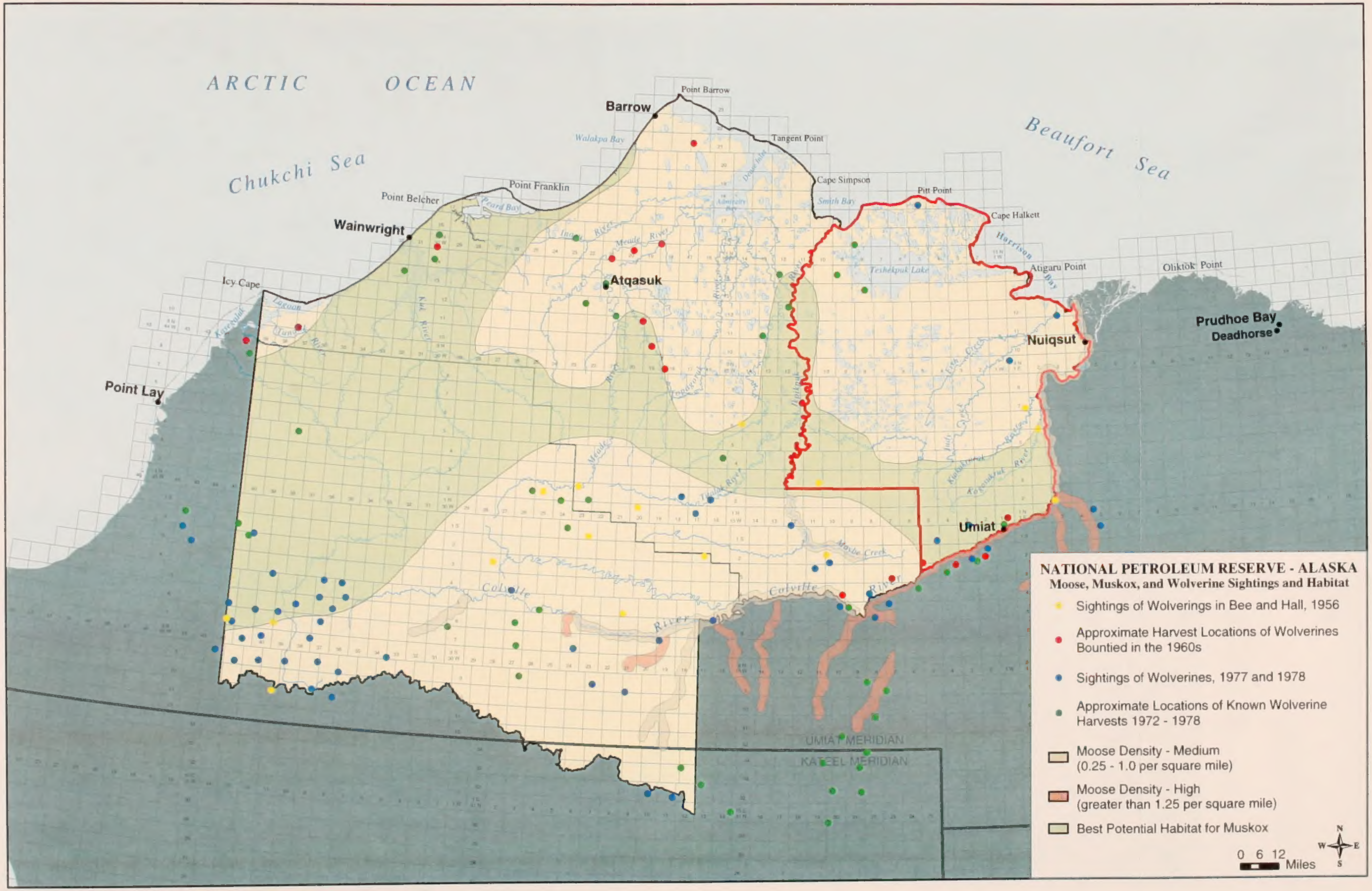


Source: USDOI BLM and MMS 1998

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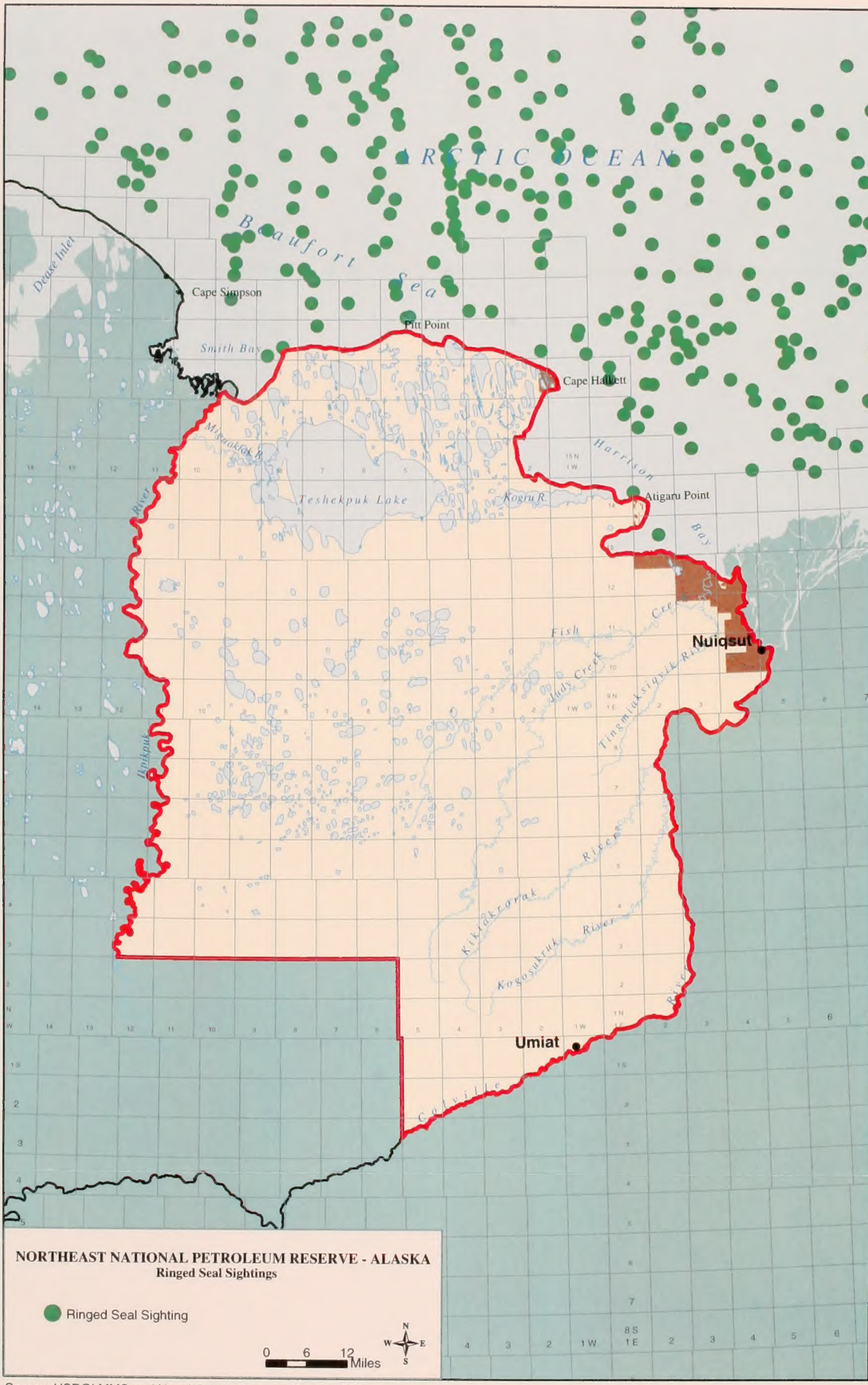


Source: USDOI MMS and Naval Ocean Systems Center 2002

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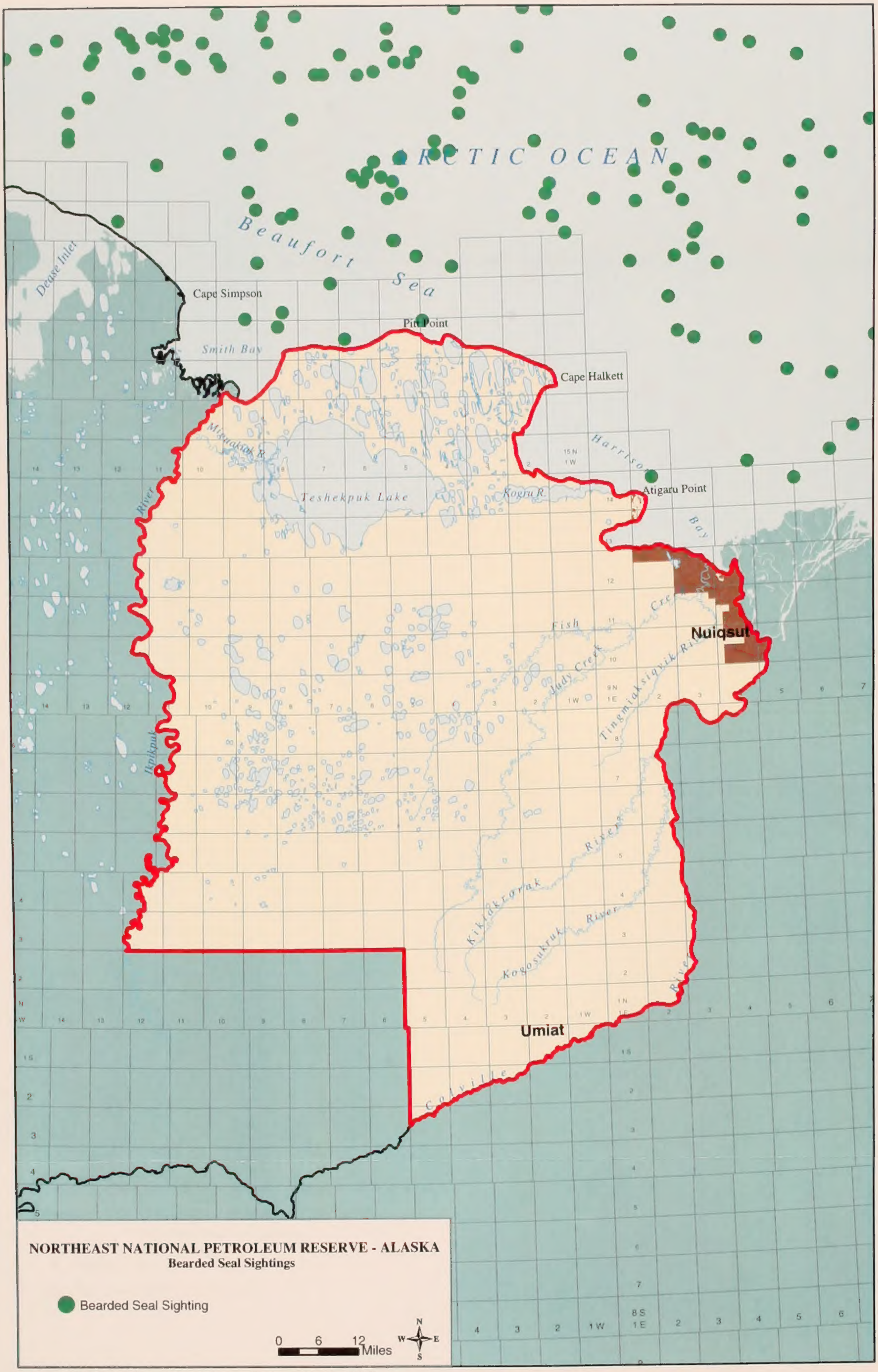


Source: USDOI MMS and Naval Ocean Systems Center, 2002

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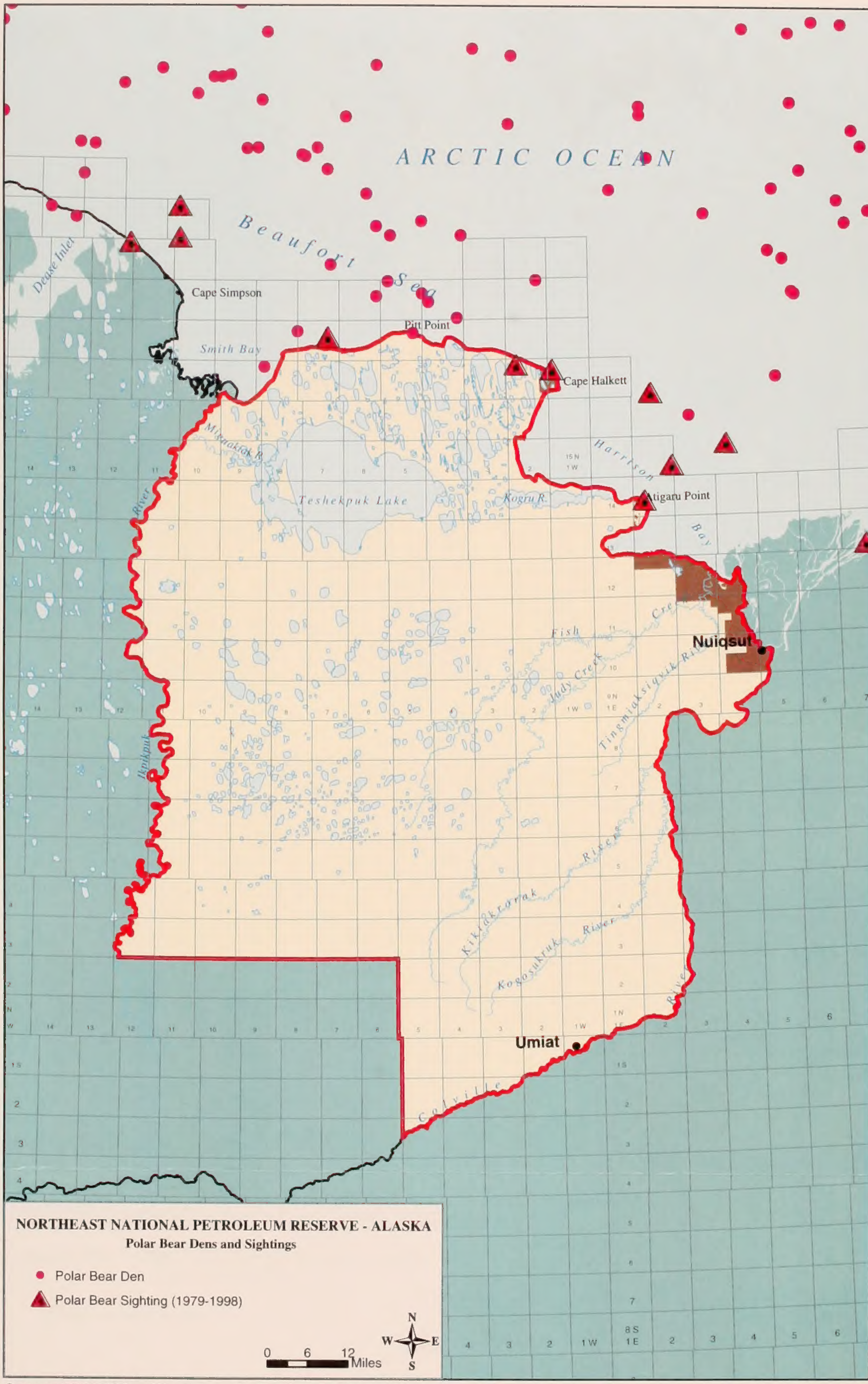


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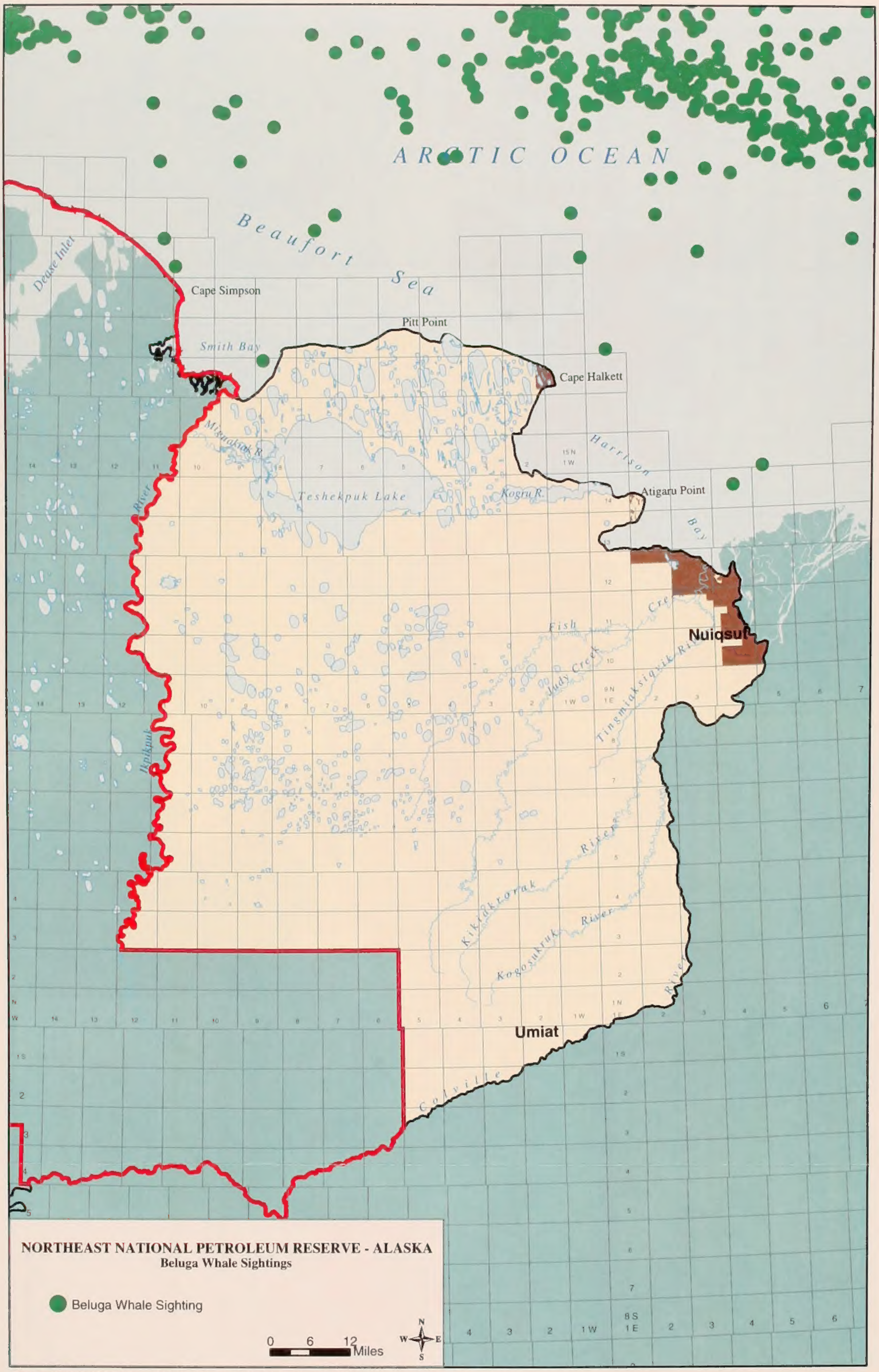


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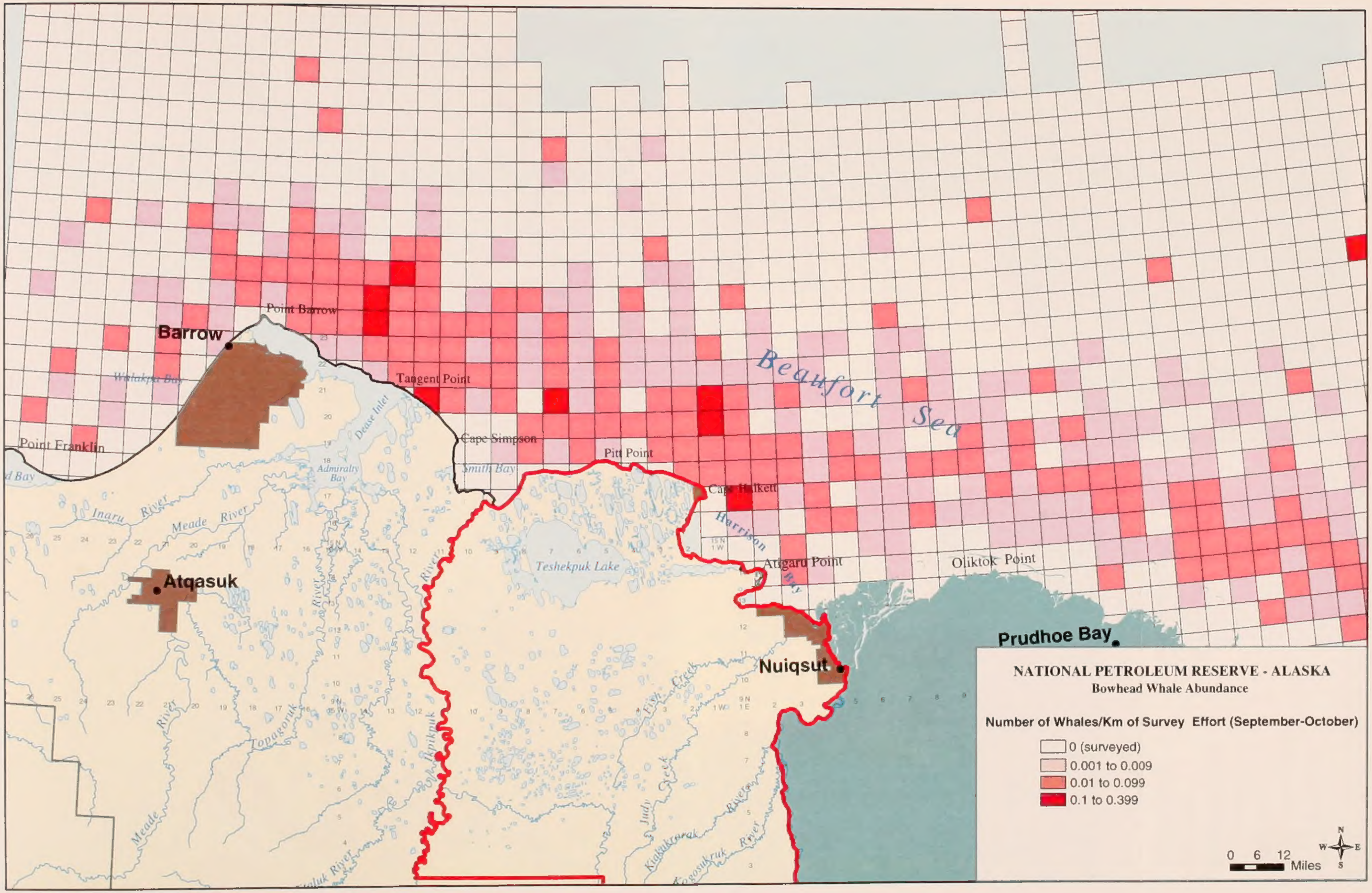


Source: USDOI MMS 2002

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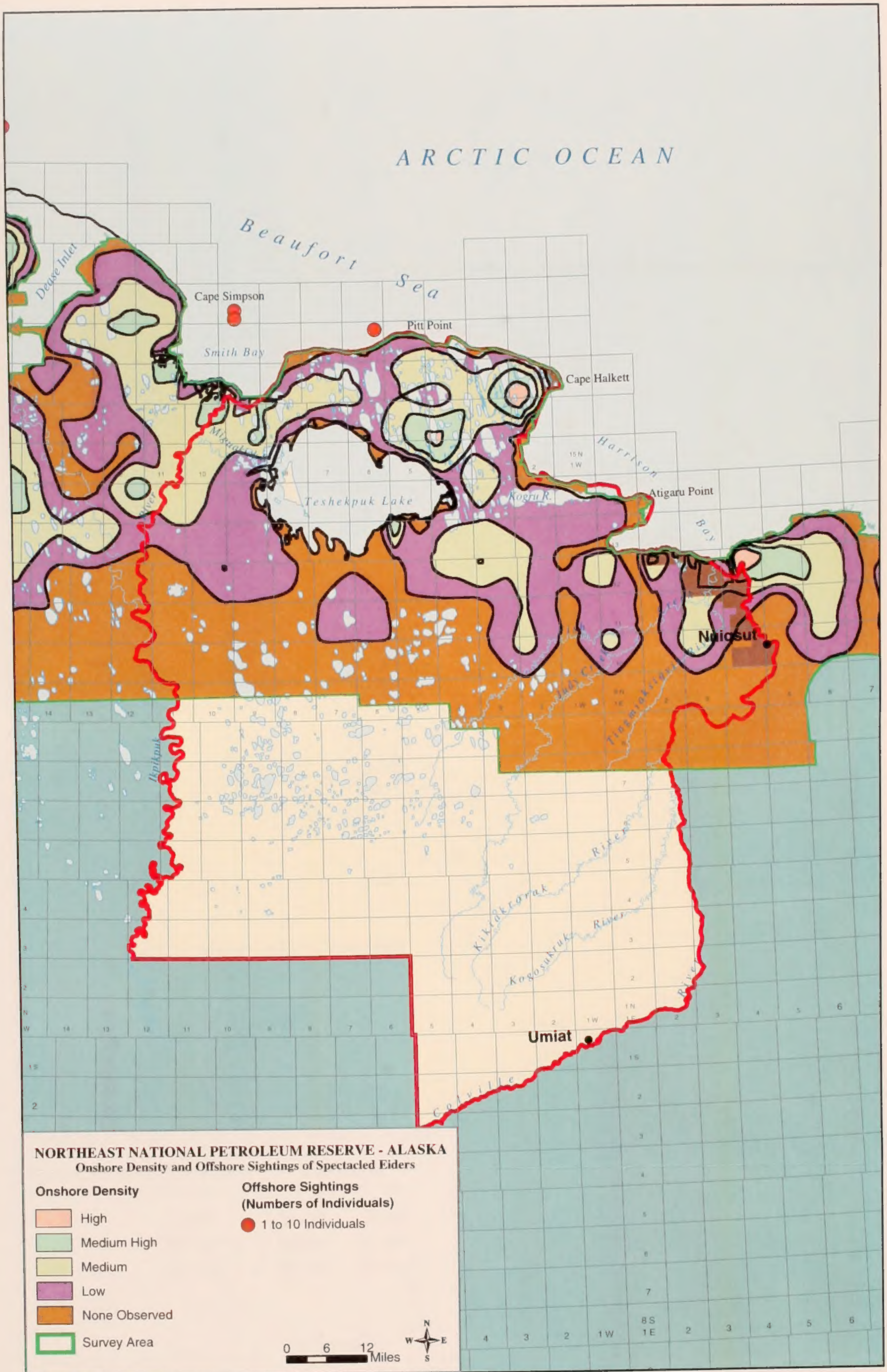


Source: U.S. Fish and Wildlife Service 2002 Eider Breeding Population Surveys and Offshore Survey

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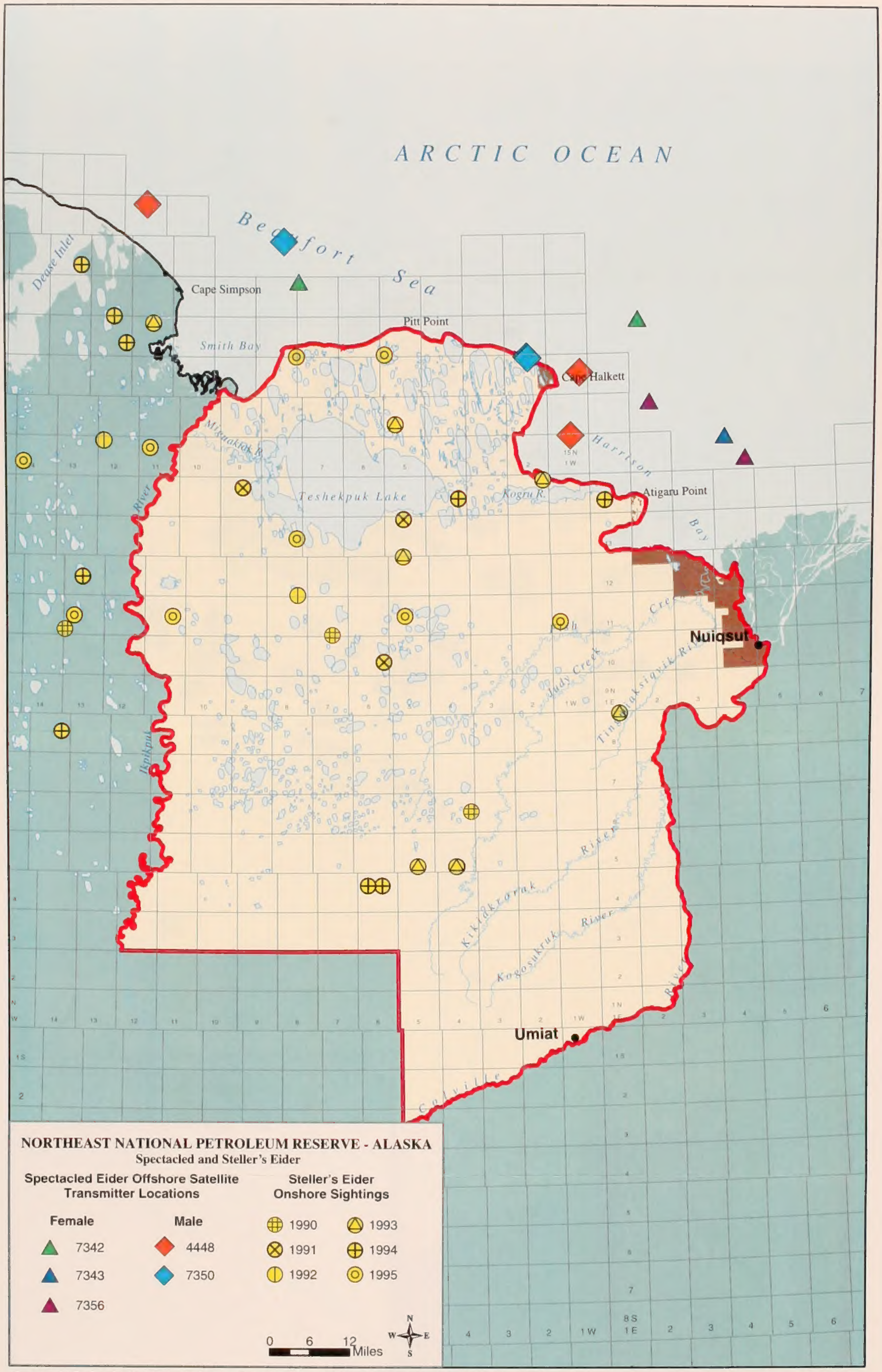
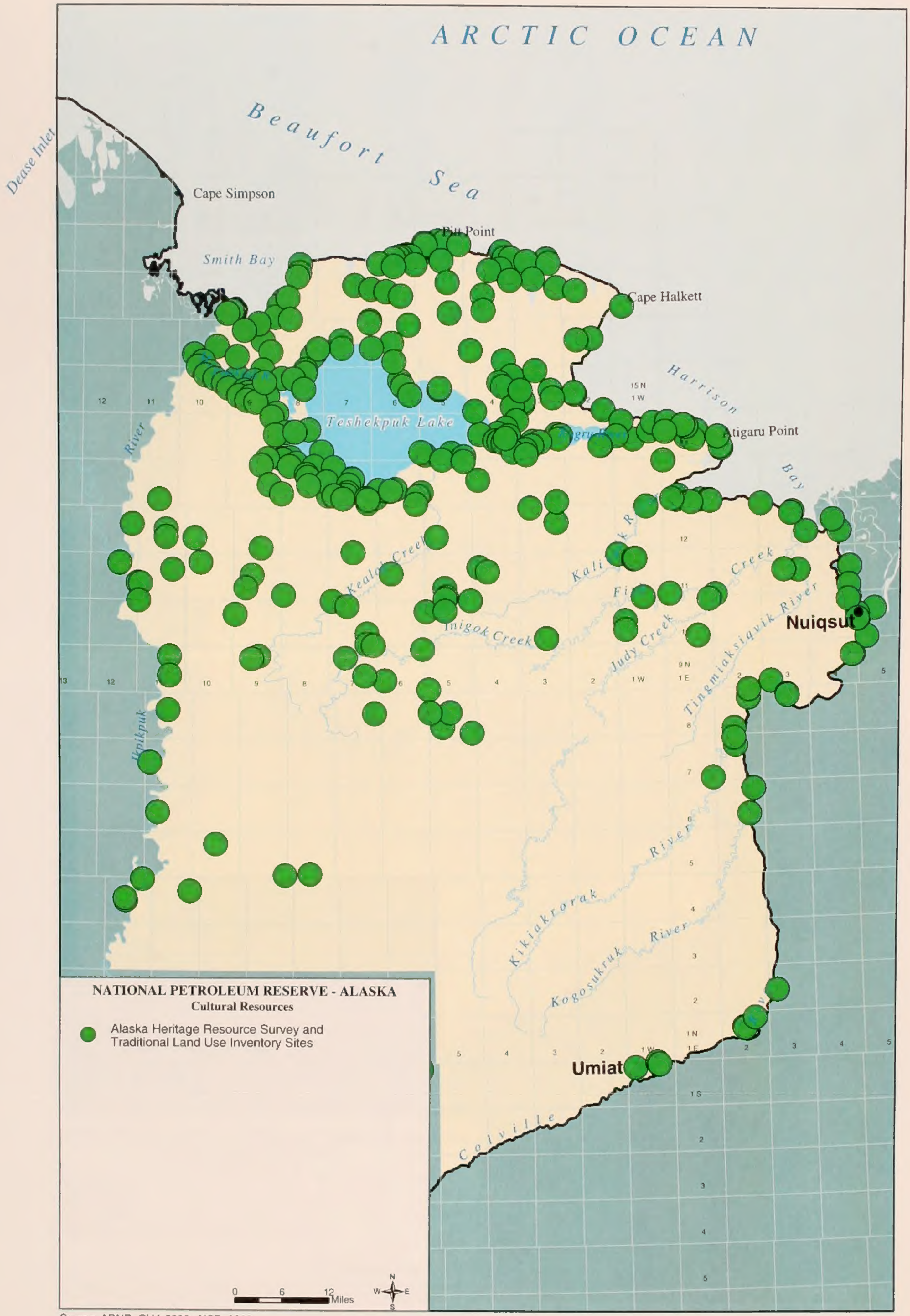


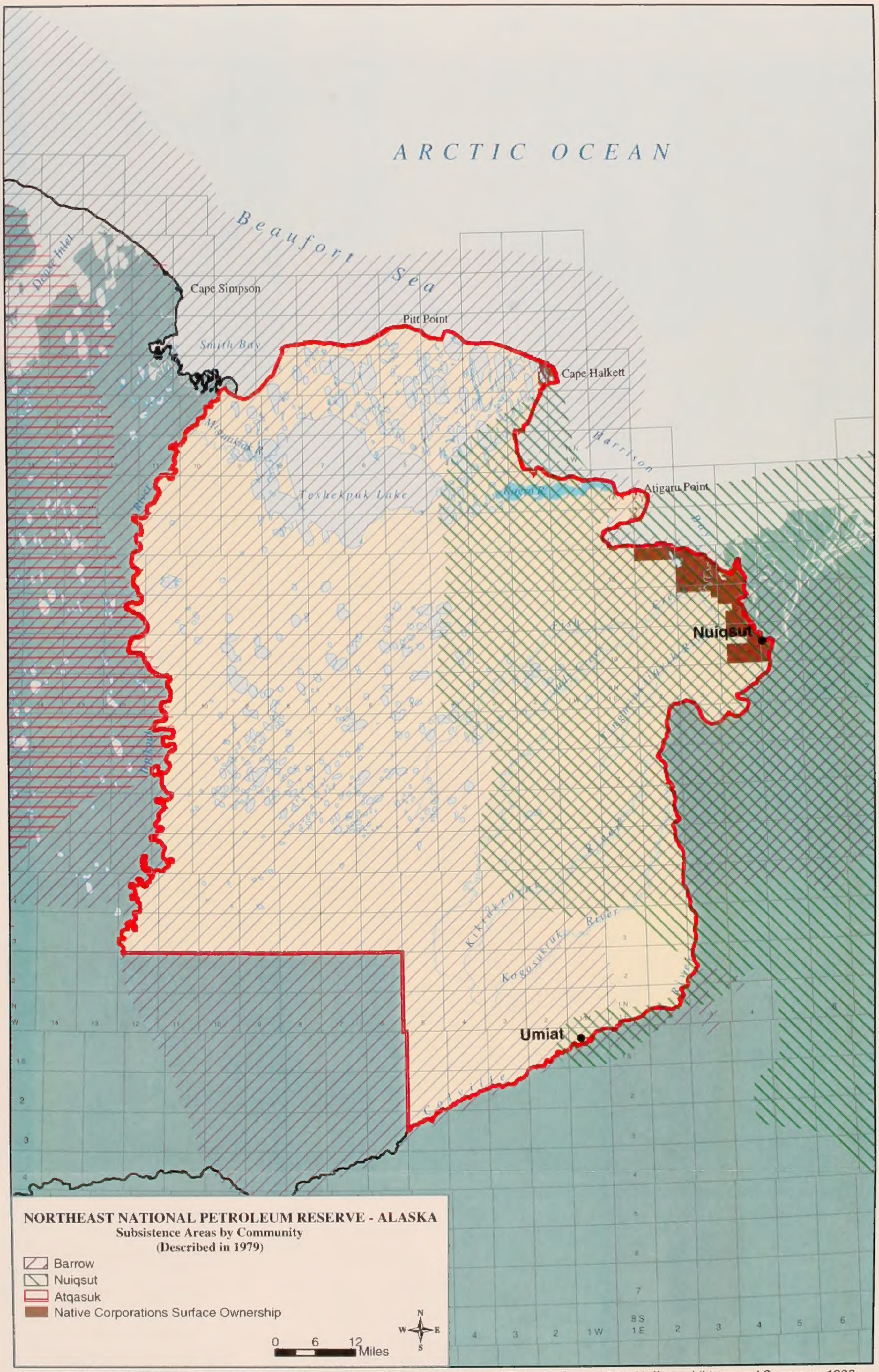

Source: U.S. Geological Survey Alaska Science Center 2002 and U.S. Fish and Wildlife Service 2002

**Map 3-34. Offshore Locations of Satellite Transmitter-Equipped Spectacled Eiders in Summer 1995 and 1996 and Onshore Sightings of Steller's Eiders 1990-1995 in the Northeast National Petroleum Reserve-Alaska**



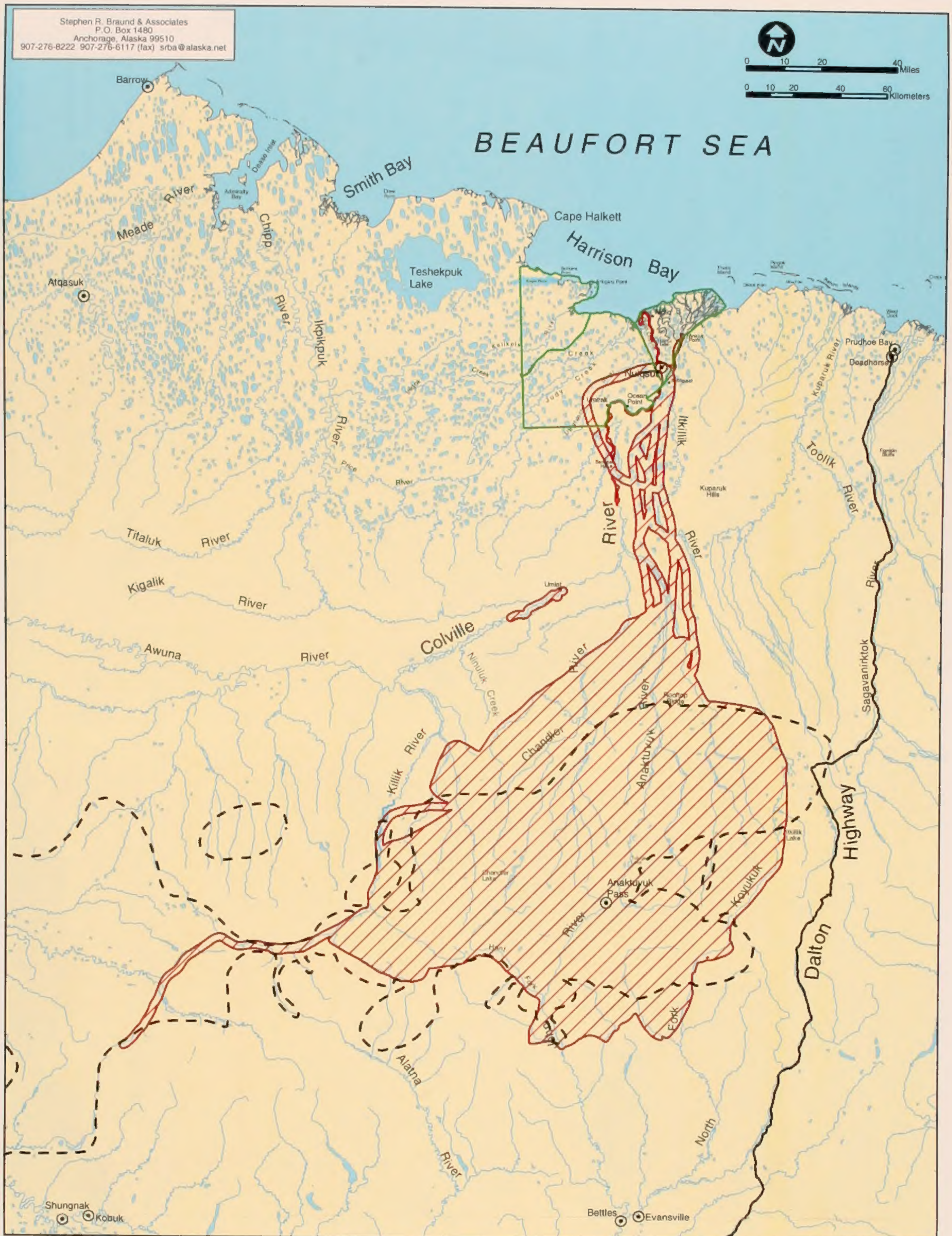

Source: ADNR, OHA 2003; NSB, 2003

**Map 3-35. Cultural Resources in the Northeast National Petroleum Reserve - Alaska**




Source: Pedersen 1979; North Slope Borough 1979 and 1993; Alaska Department of Fish and Game 1986; Hoffman, Libbey, and Spearman 1988; and SRBA 1989a.

**Map 3-36. Barrow, Atqasuk, and Nuisut Community Subsistence Areas in Northeast National Petroleum Reserve-Alaska**




Maps Pending Review by Anaktuvuk Pass

PRELIMINARY DATA

Other areas may also be used for resource harvesting.

Alpine Satellite Development Plan EIS
Prepared for BLM

Scale: 1:1,500,000

**Alaska Albers Equal-Area Conic projection**
**NAD27 Datum (Clarke 1866 Spheroid)**

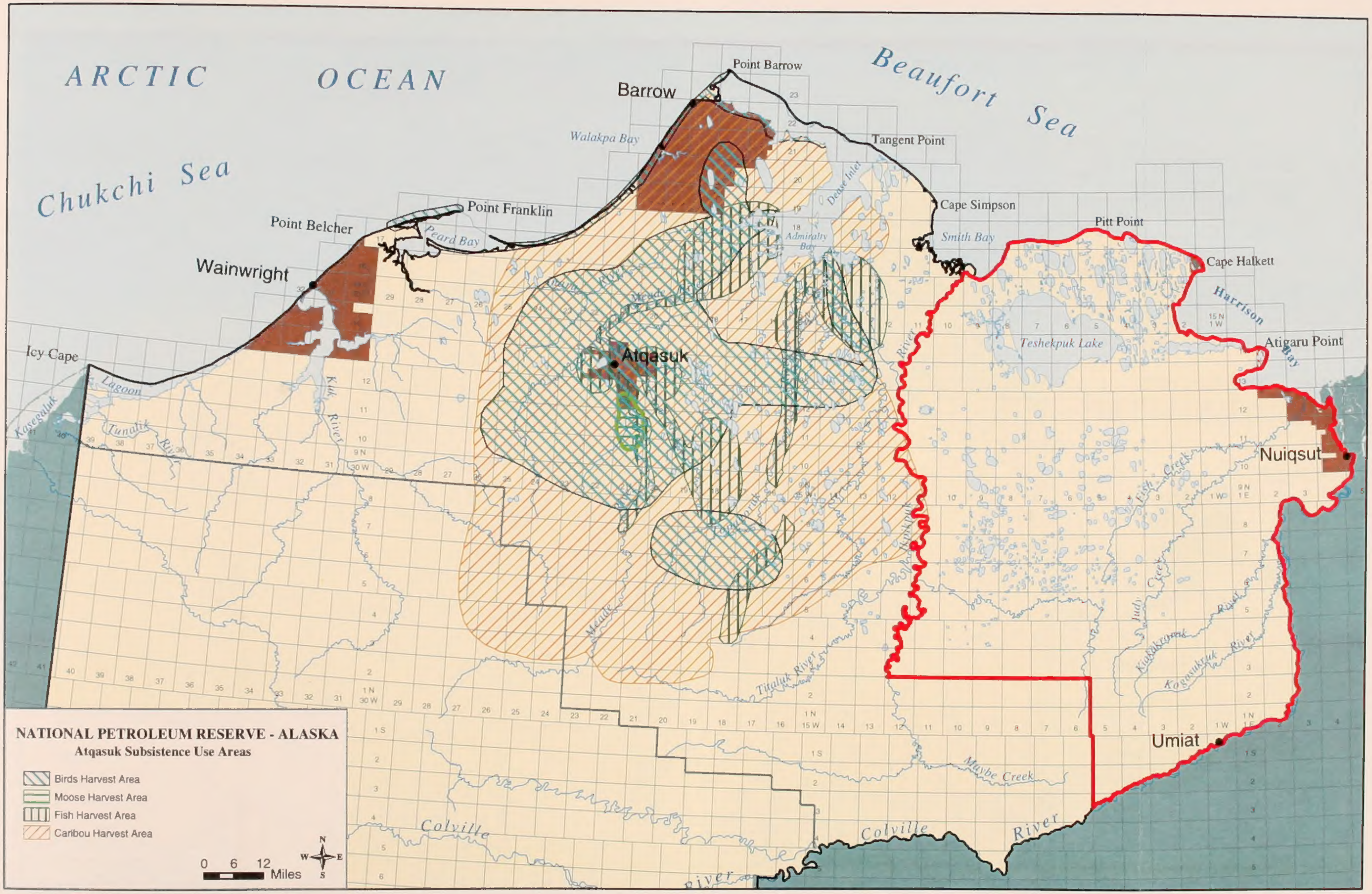
**Legend**

- Communities
- Project Sub-areas
- Recent Use Areas - Multiple Resources (last 10 years)
- Anaktuvuk Pass Lifetime Community Use Areas (Pederson 1979)

Source: Stephen R. Braund & Associates (SRB&A) conducted interviews with 12 Anaktuvuk Pass subsistence harvesters in August 2003. SRB&A coordinated with the City of Anaktuvuk Pass that identified knowledgeable Anaktuvuk Pass subsistence users. SRB&A conducted the interviews in conjunction with the Alpine Satellite Development Plan EIS.

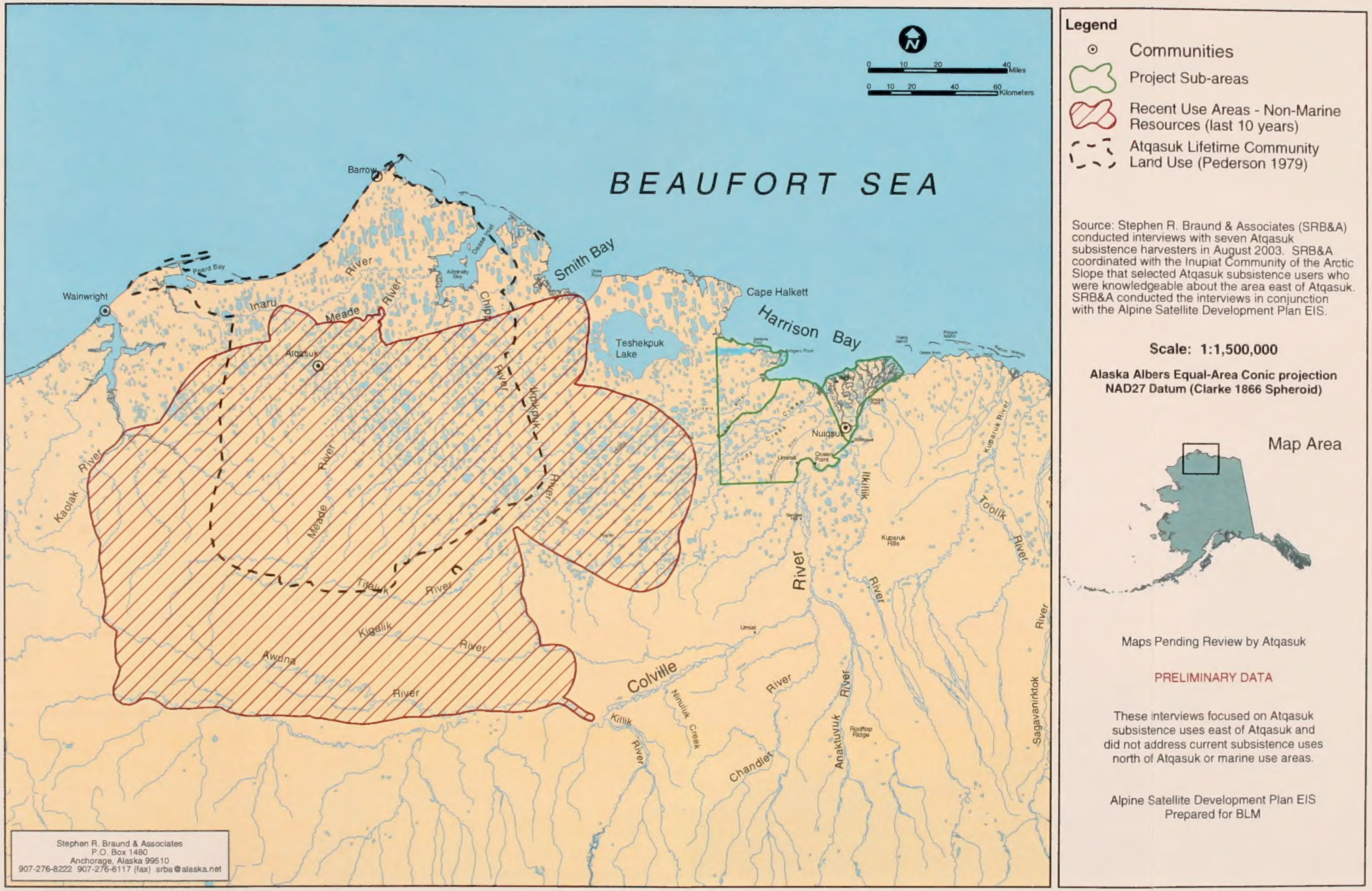
Map Area

**Map 3-37. Anaktuvuk Pass Partial Subsistence Use Areas for Multiple Resources, 2003**




Source: Pederson 1979 and North Slope Borough 1979

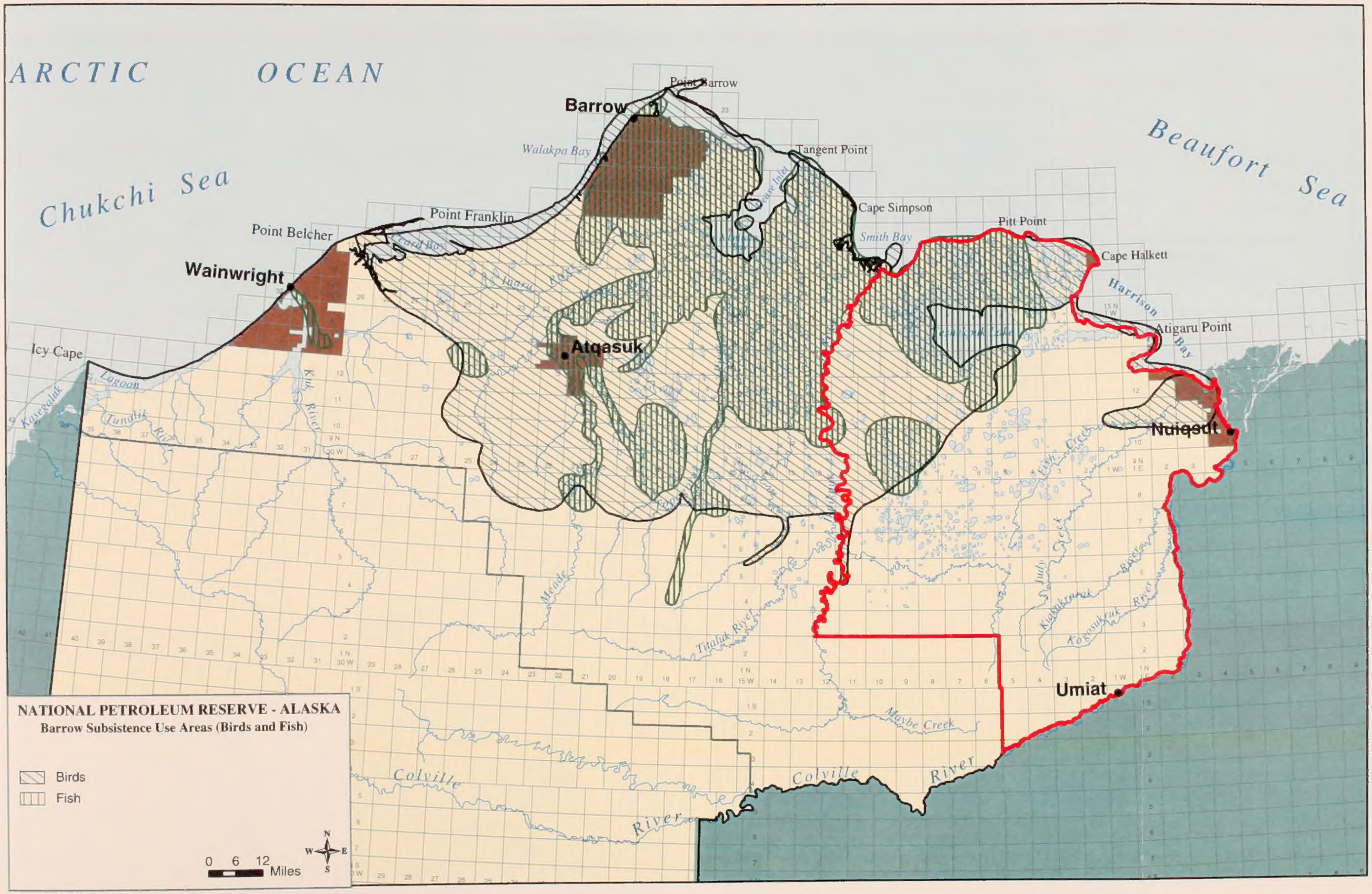
**Map3-38. Atqasuk Subsistence Use Areas for Moose, Caribou, Fish, and Birds in the National Petroleum Reserve-Alaska**




**Map 3-39. Atqasuk Partial Subsistence Use Areas for Non-Marine Resources, 2003**

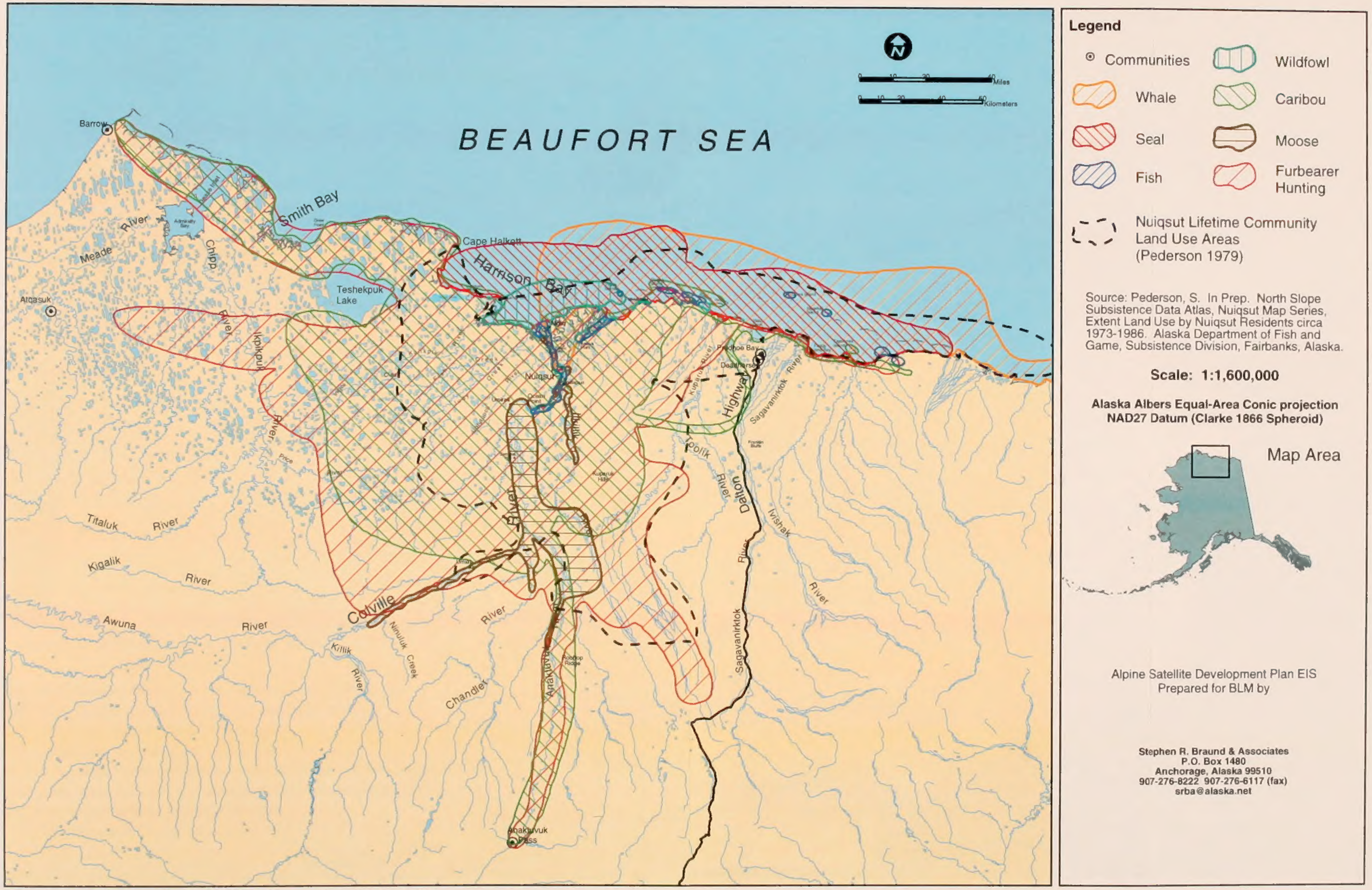

Source: Pedersen 1979 and NSB 1979

**Map 3-40. Barrow Subsistence Use Areas for Whale, Moose, and Caribou in the National Petroleum Reserve-Alaska**

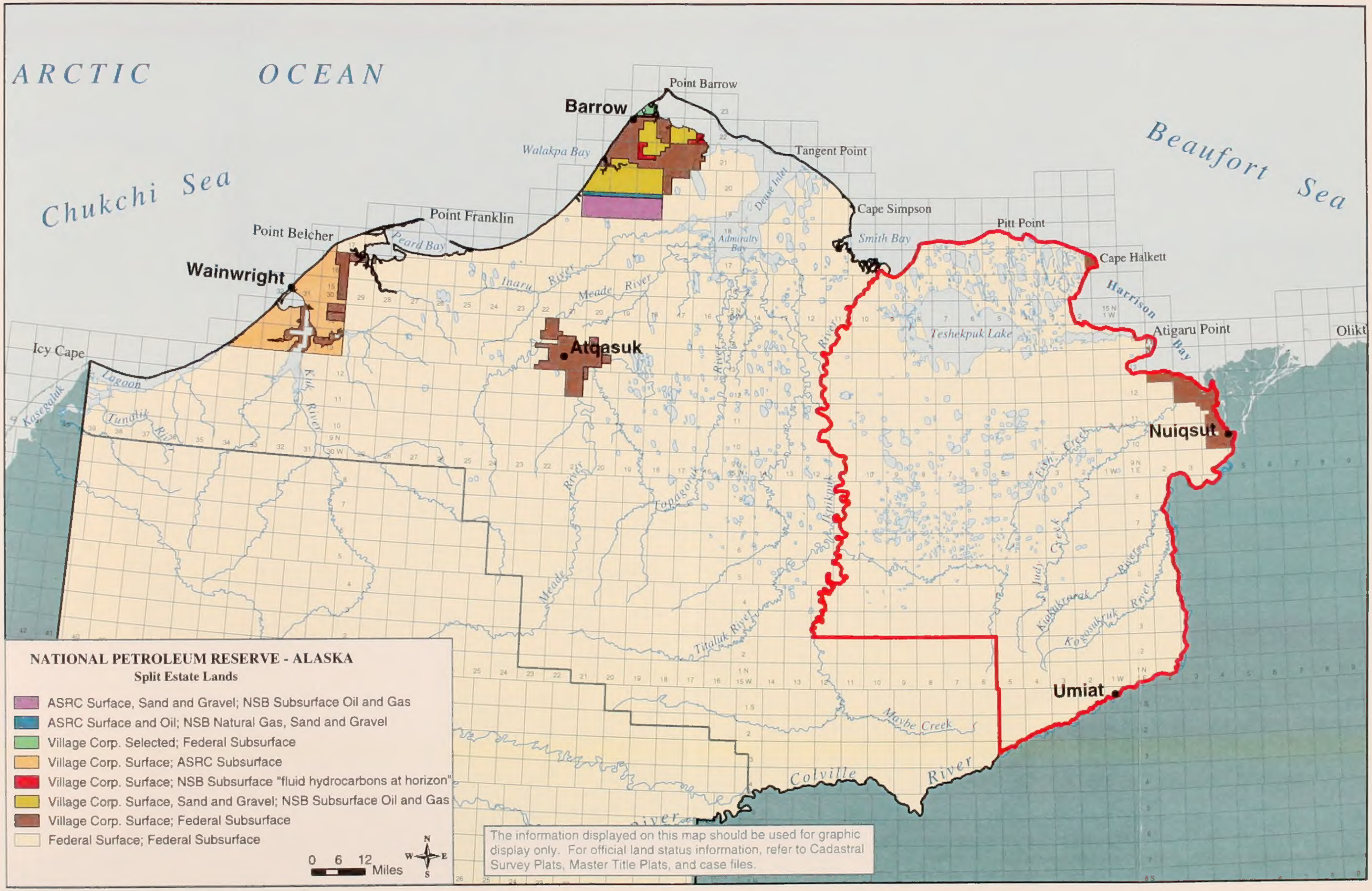



Source: Pedersen 1979 and NSB 1979

**Map 3-41. Barrow Subsistence Use Areas for Fish and Birds in the National Petroleum Reserve-Alaska**

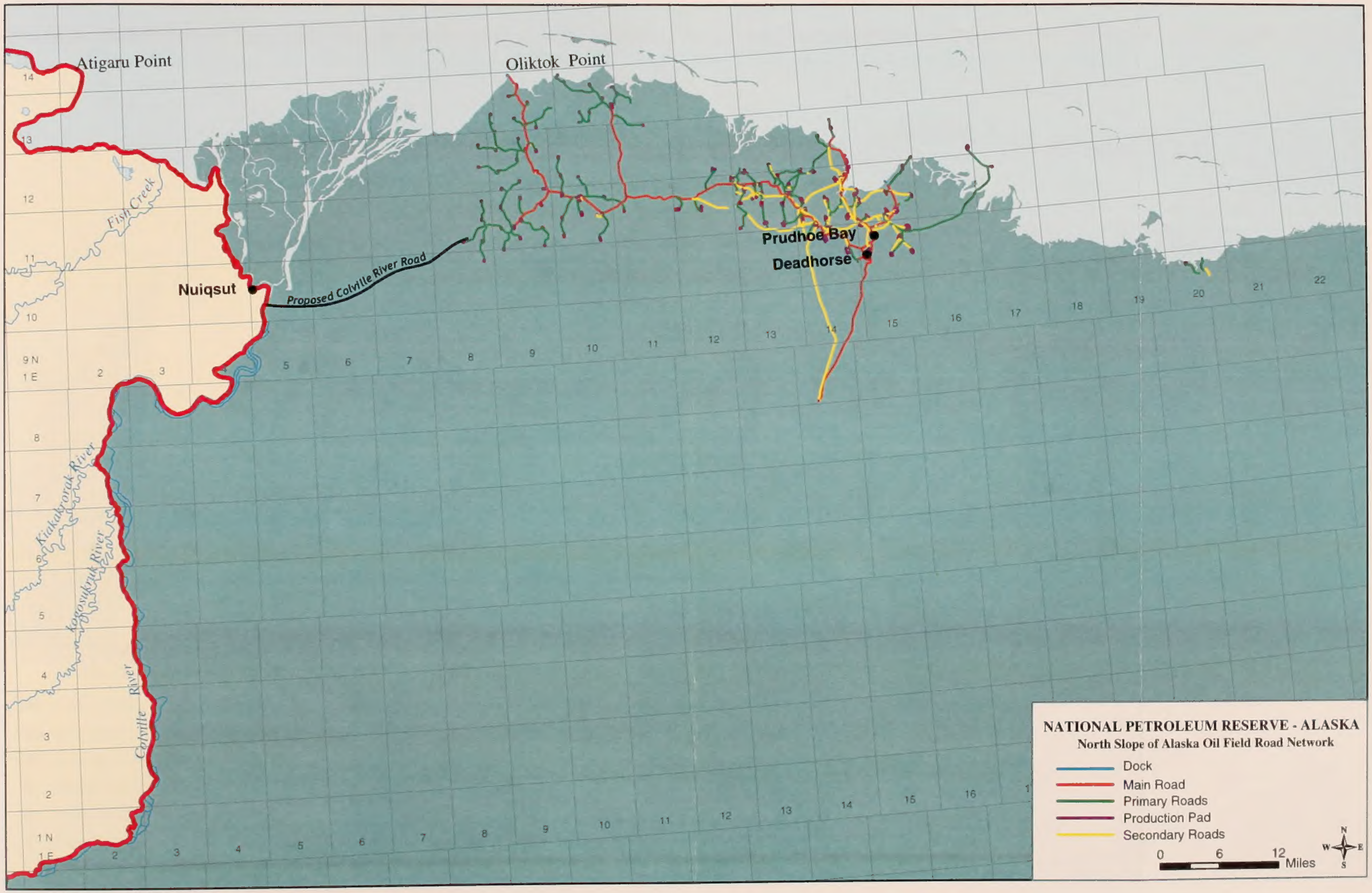



**Map 3-42. Nuiqsut Subsistence Land Use 1973-1986**




Source: USDOI BLM MMS 2002

**Map 3-43. Surface and Subsurface Split Estate Lands in the National Petroleum Reserve-Alaska**

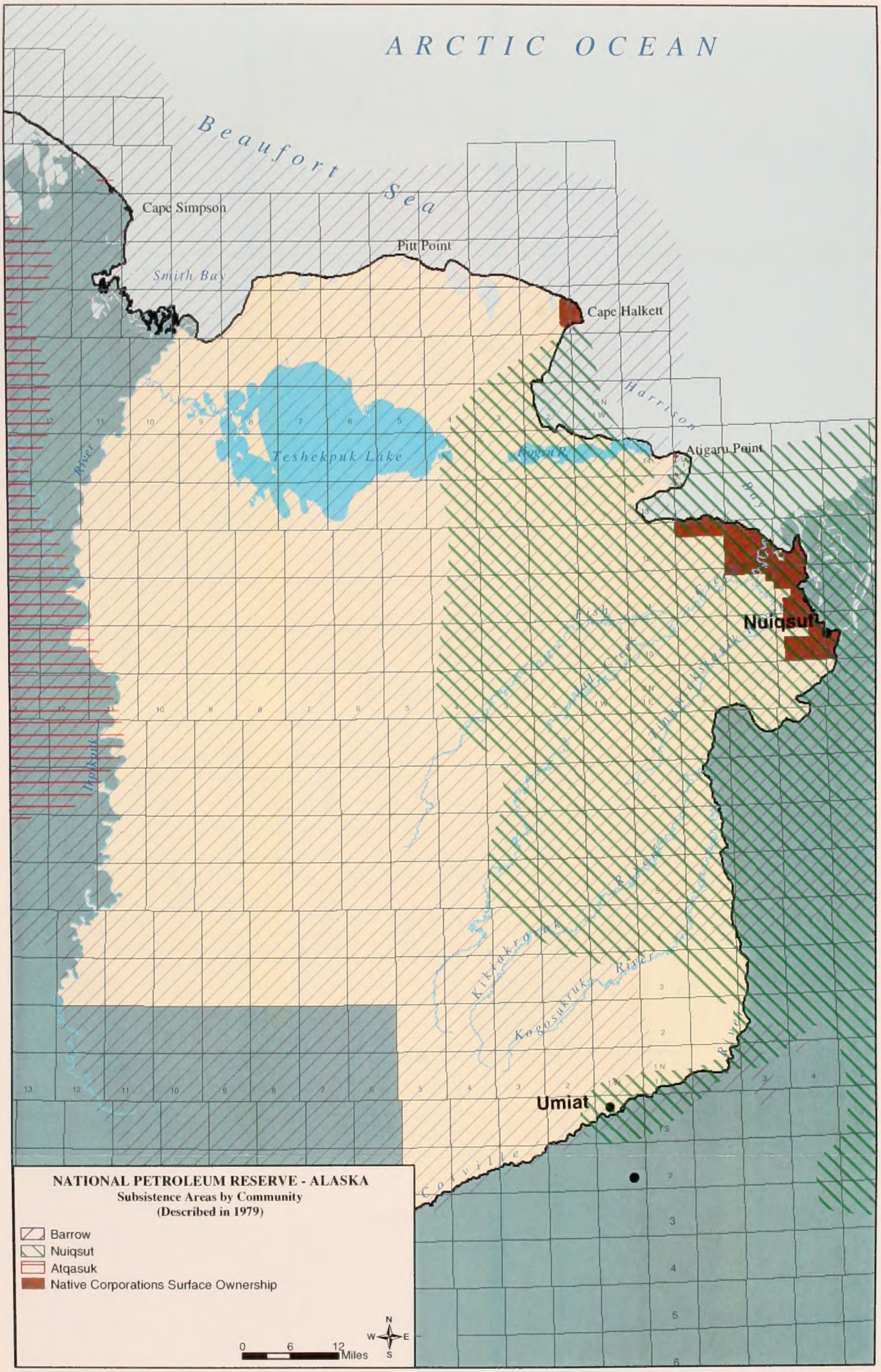



Source: USDOI BLM and MMS 2002

**Map 3-44. Oil Fields Road Network on North Slope**

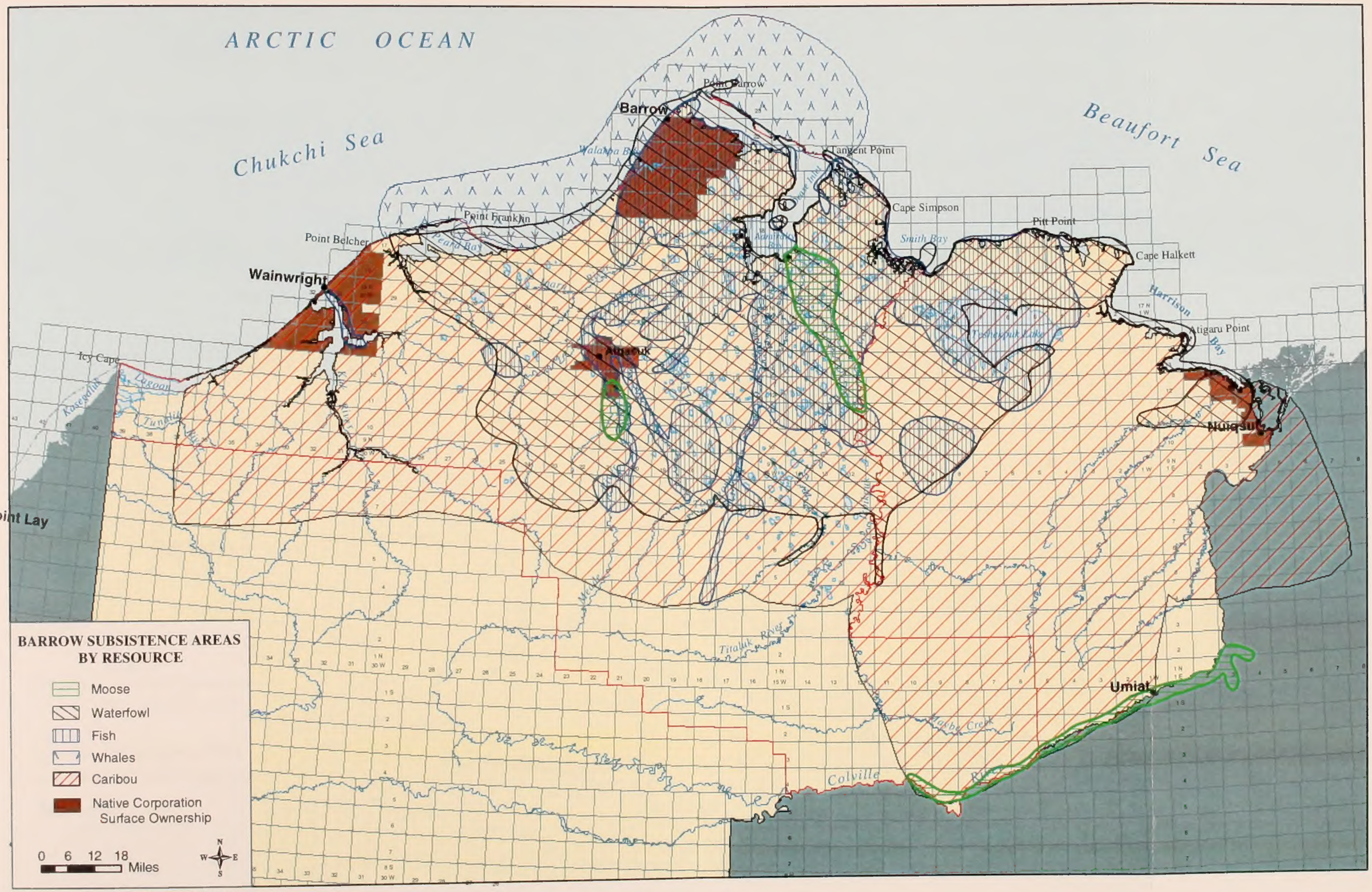

Source: USDOI BLM and MMS 1998

**Map 3-45. Locations of Possible Oil and Gas Staging Facilities in the National Petroleum Reserve-Alaska**



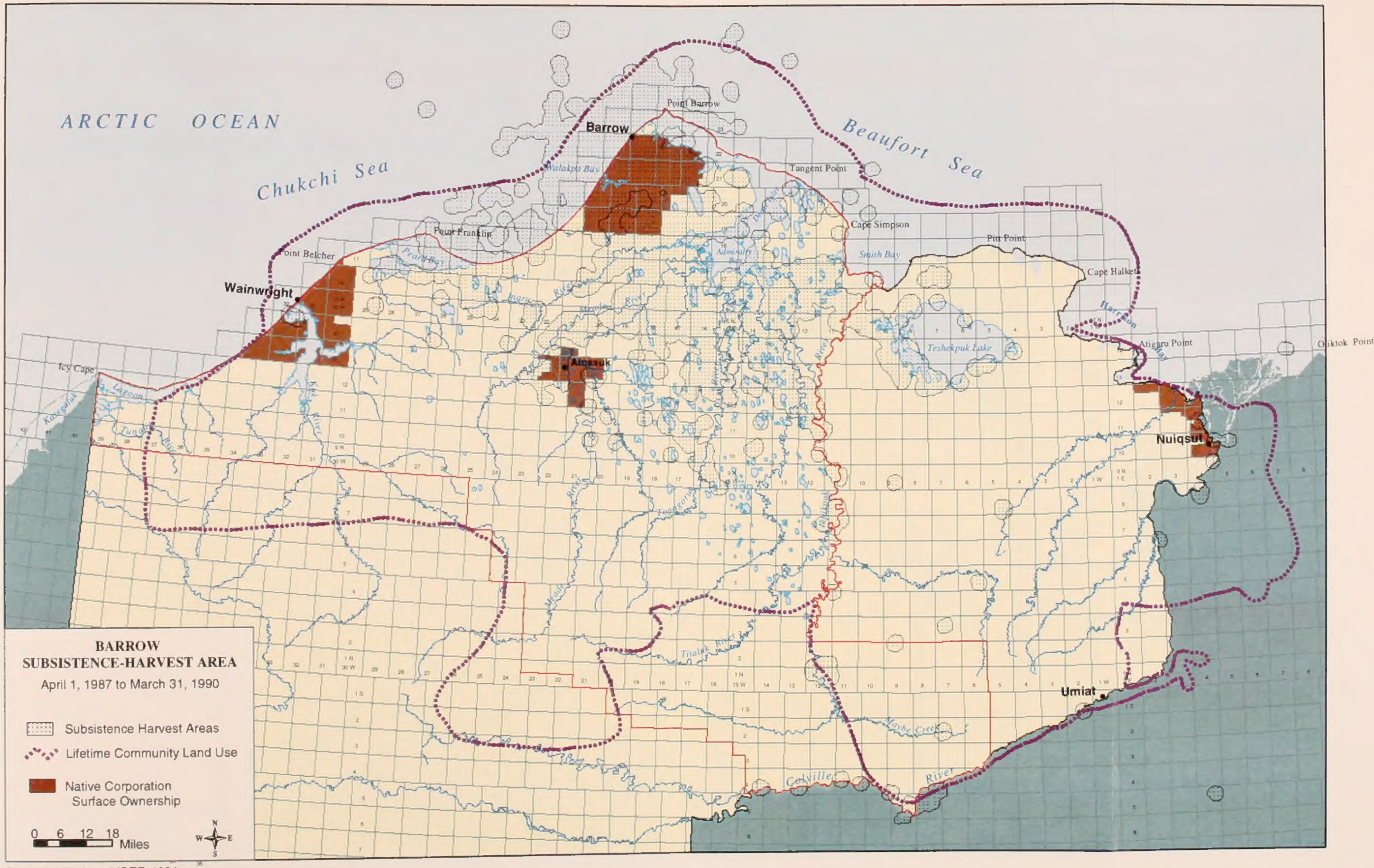

Source: Pedersen 1979; North Slope Borough 1979, and 1993; Alaska Department of Fish and Game 1986; Hoffman Libbey and Spearman 1988; and SRBA 1989a.

**Map J-1. Barrow, Atqasuk, and Nuiqsut Community Subsistence Areas (1979)**



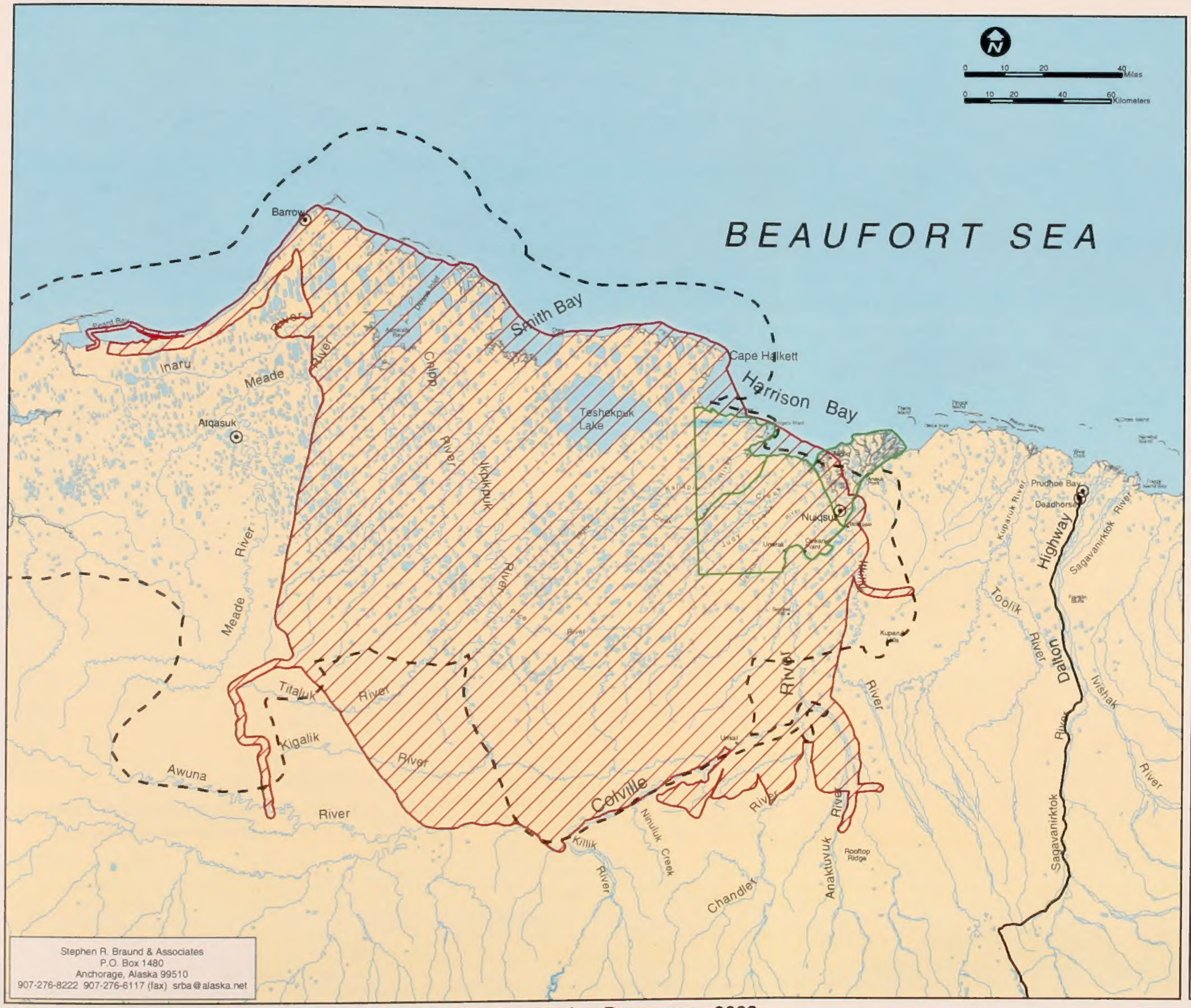

Source: Pedersen 1979 and NSB 1979.

**Map J-2. Barrow Subsistence Use Areas for Whale, Moose, Caribou, Fish, and Birds**




Source: SRBA and ISER 1991.

**Map J-3. Barrow Subsistence-Harvest Sites for All Resources**




**Legend**

- Communities
- Project Sub-areas
- Recent Use Areas - Non-Marine Resources (last 10 years)
- Barrow Lifetime Community Land Use - All Resources (Pederson 1979)

Source: Stephen R. Braund & Associates (SRB&A) conducted interviews with eight Barrow subsistence harvesters in August 2003. SRB&A coordinated with the Inupiat Community of the Arctic Slope that selected Barrow subsistence users who were knowledgeable about the area southeast of Barrow. SRB&A conducted the interviews in conjunction with the Alpine Satellite Development Plan EIS.

**Scale: 1:1,500,000**

**Alaska Albers Equal-Area Conic projection**
**NAD27 Datum (Clarke 1866 Spheroid)**

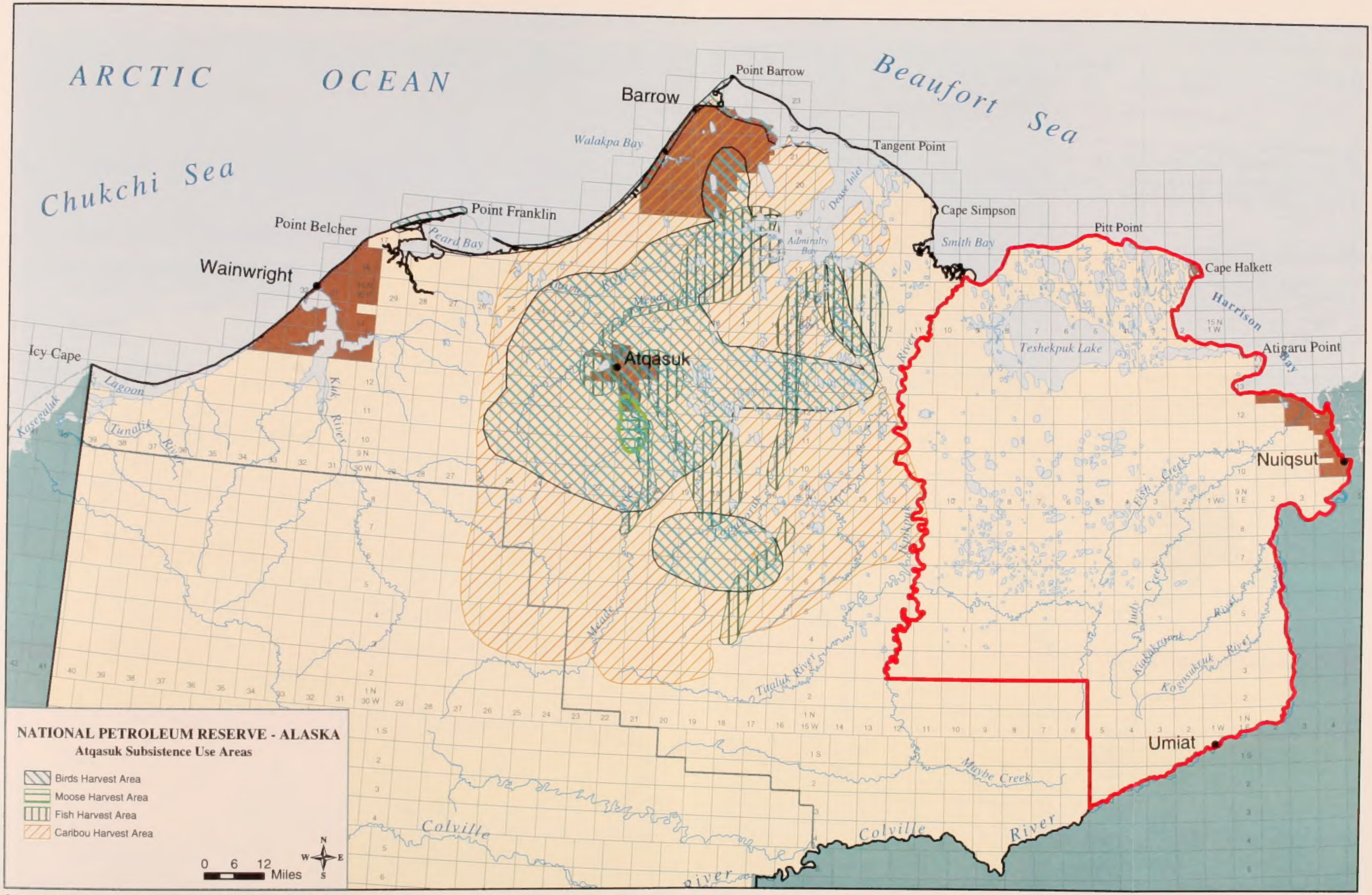

Maps Pending Review by Barrow

PRELIMINARY DATA

These interviews focused on Barrow subsistence uses southeast of Barrow and did not address current subsistence uses south and southwest of Barrow or marine use areas.

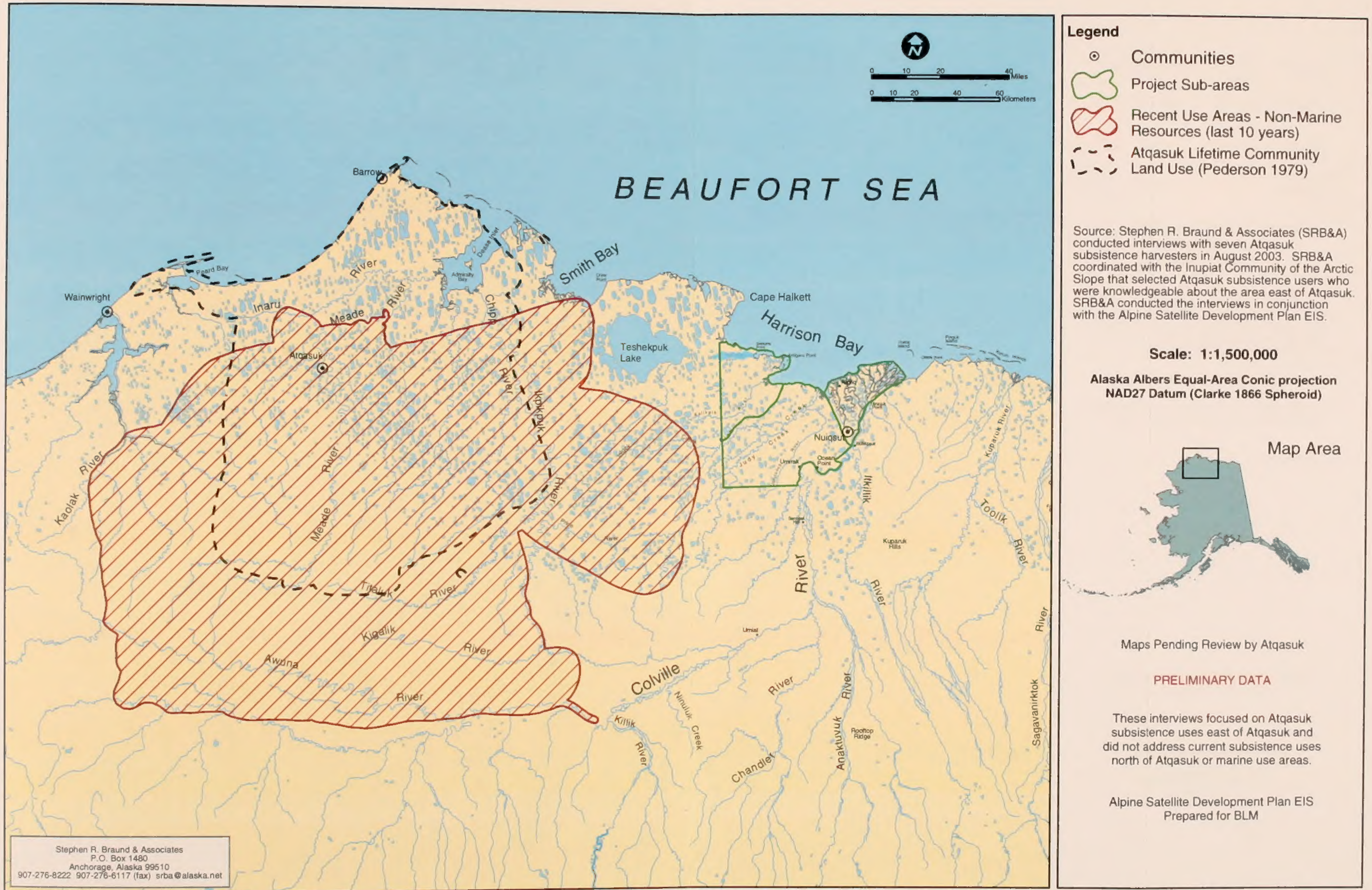
Alpine Satellite Development Plan EIS
Prepared for BLM

**Map J-4. Barrow Partial Subsistence Use Areas for Non-Marine Resources, 2003**

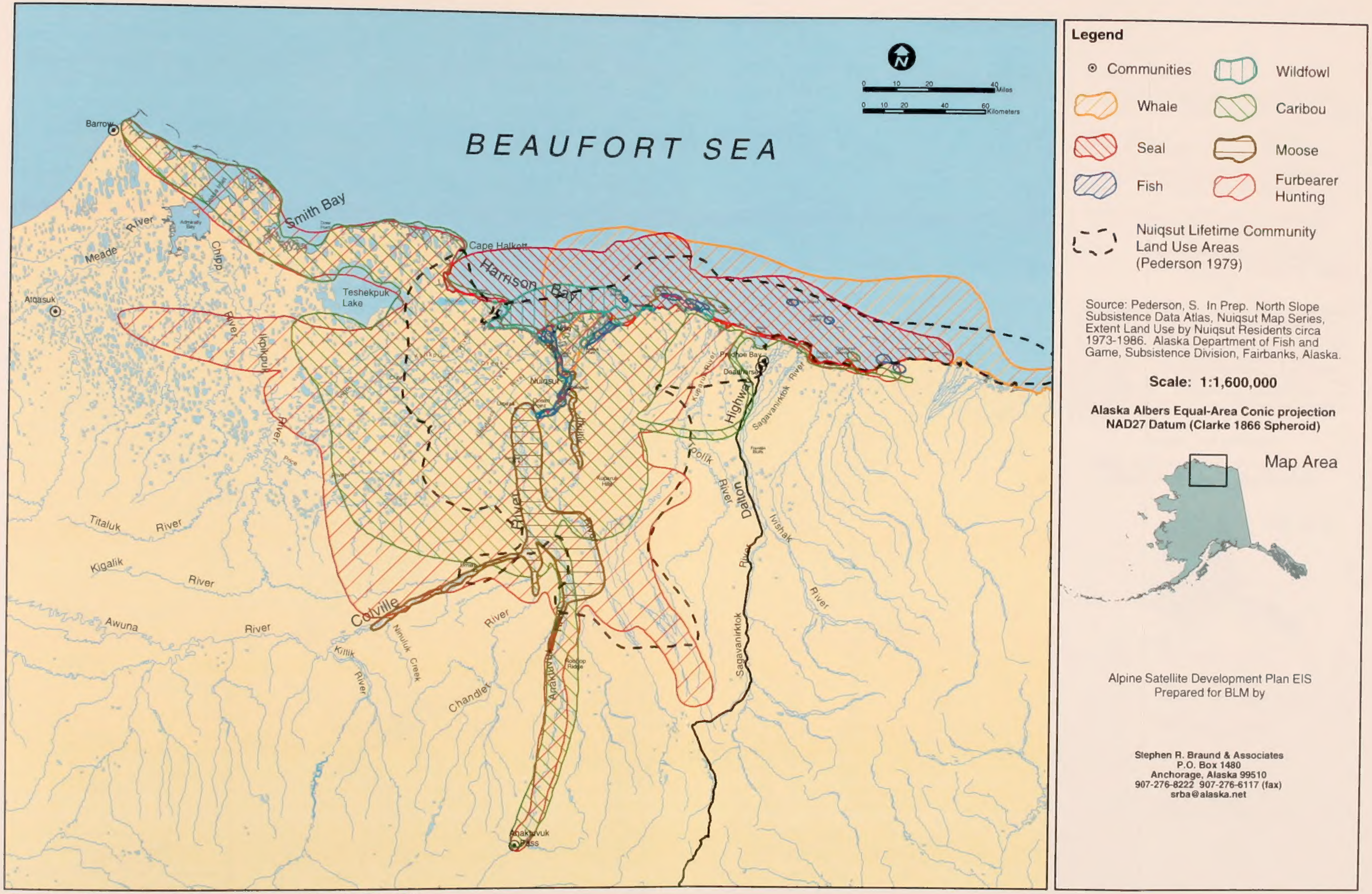



Source: Pederson 1979 and North Slope Borough 1979

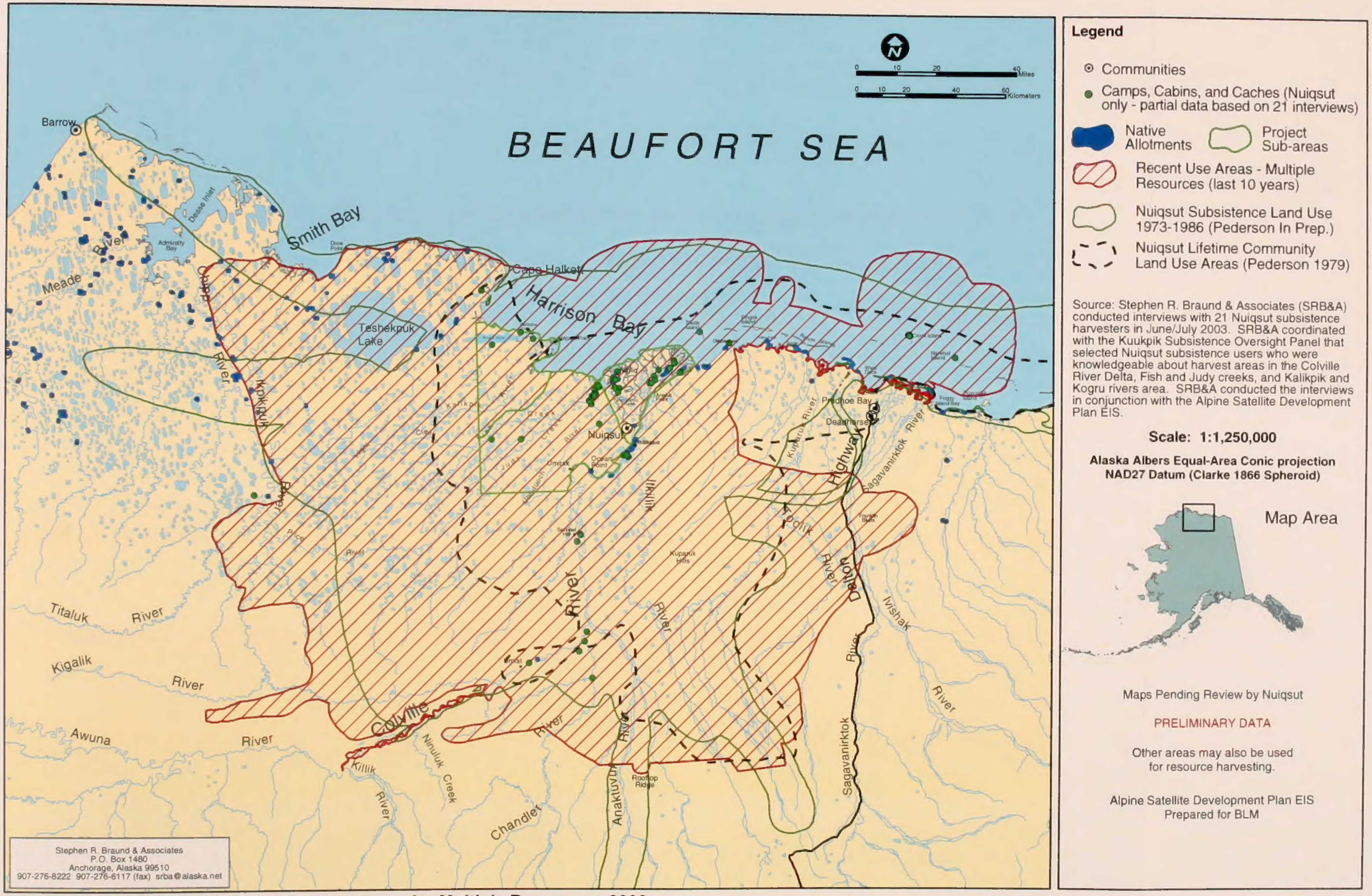
**Map J-5. Atqasuk Subsistence Use Areas for Moose, Caribou, Fish, and Birds in the National Petroleum Reserve-Alaska**



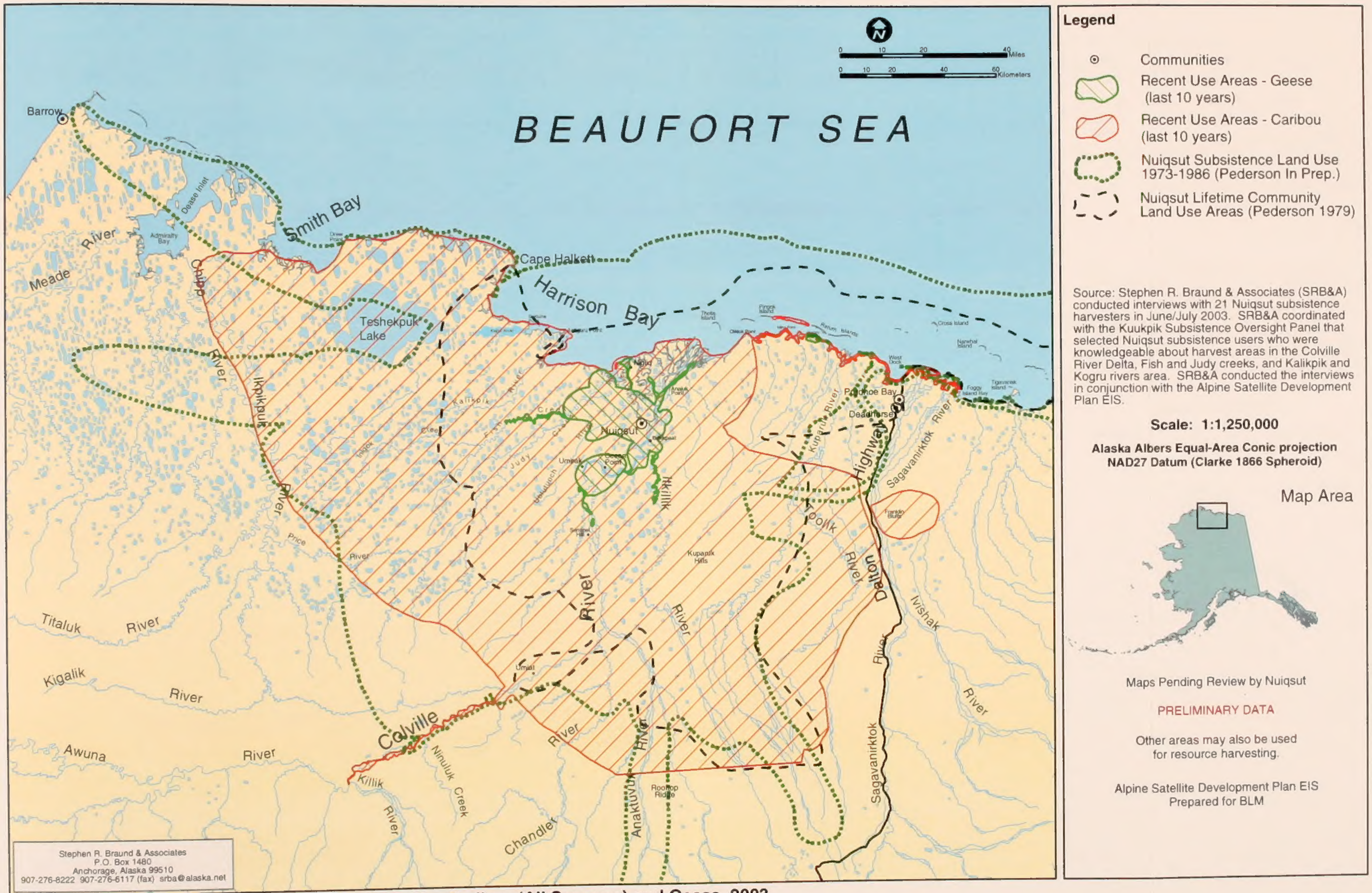

**Map J-6. Atqasuk Partial Subsistence Use Areas for Non-Marine Resources, 2003**



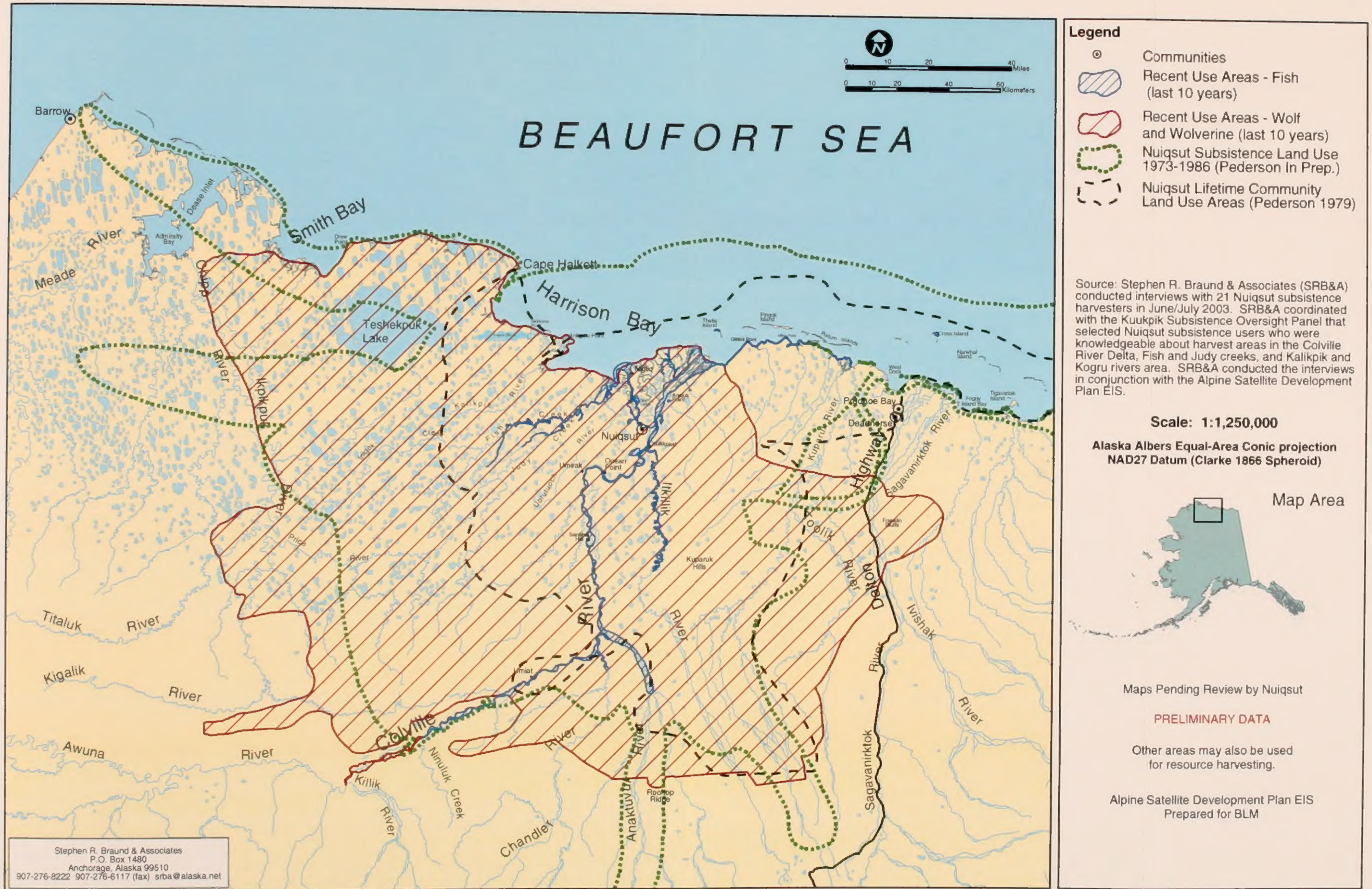

Map J-7. Nuiqsut Subsistence Land Use 1973-1986



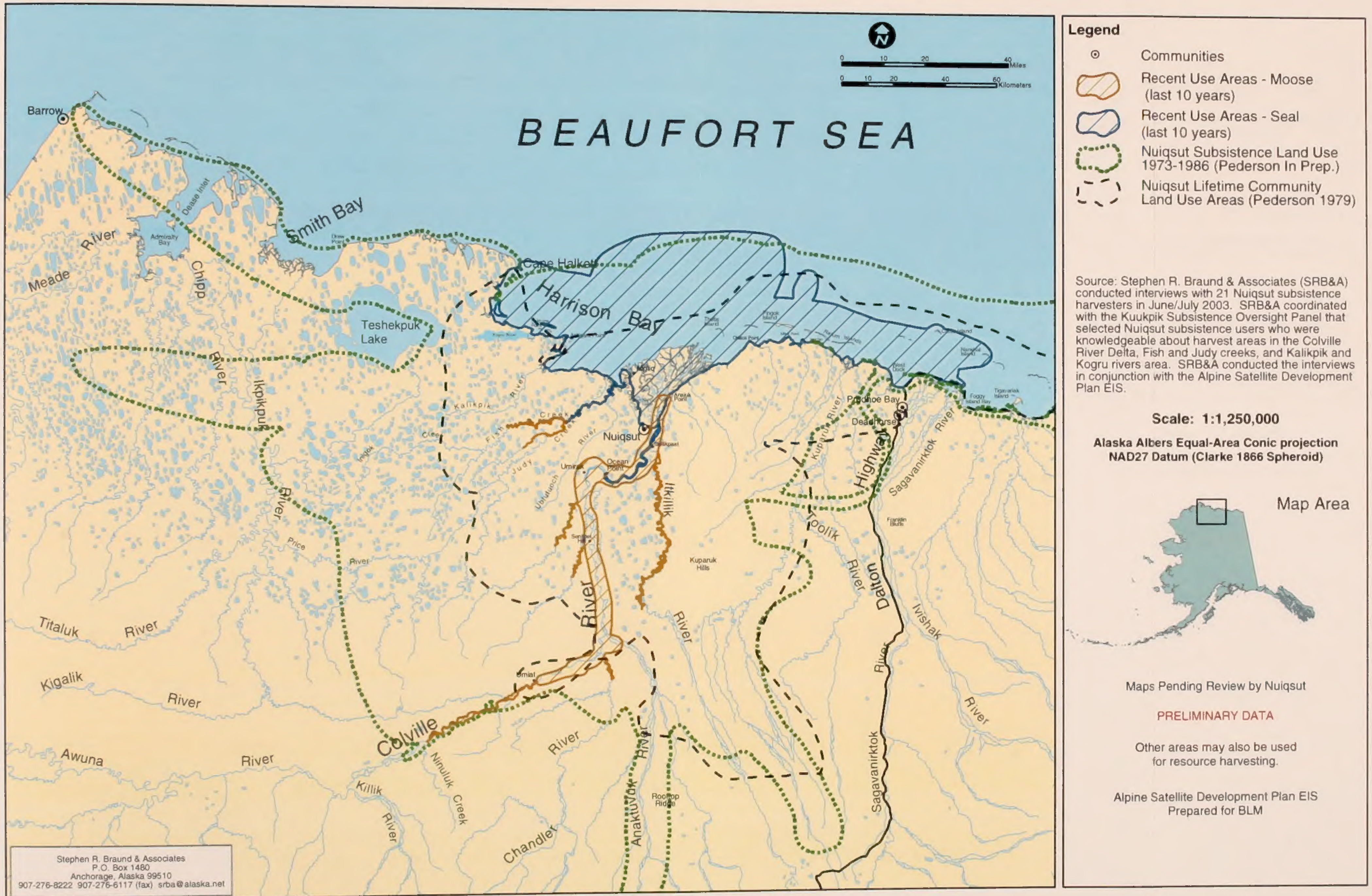

**Map J-8. Nuiqsut Partial Subsistence Use Areas for Multiple Resources, 2003**



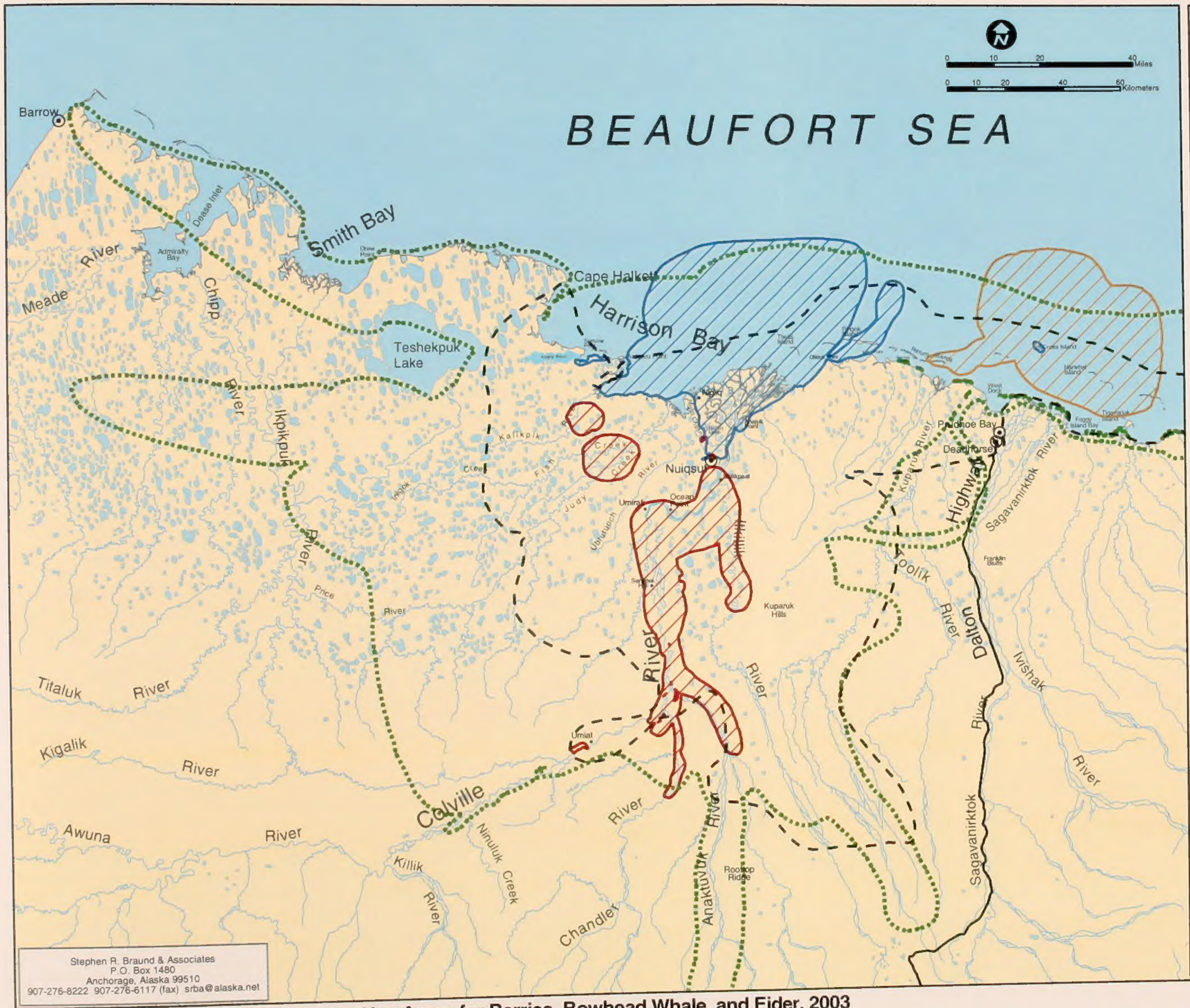

**Map J-9. Nuiqsut Partial Subsistence Use Areas for Caribou (All Seasons) and Geese, 2003**




**Map J-10. Nuiqsut Partial Subsistence Use Areas for Fish and Wolf/Wolverine, 2003**




**Map J-11. Nuiqsut Partial Subsistence Use Areas for Moose and Seal, 2003**




**Legend**

Communities

Recent Use Areas - Berries (last 10 years)

Recent Use Areas - Bowhead Whale (last 10 years)

Recent Use Areas - Eider (last 10 years)

Nuiqsut Subsistence Land Use 1973-1986 (Pederson In Prep.)

Nuiqsut Lifetime Community Land Use Areas (Pederson 1979)

Source: Stephen R. Braund & Associates (SRB&A) conducted interviews with 21 Nuiqsut subsistence harvesters in June/July 2003. SRB&A coordinated with the Kuukpik Subsistence Oversight Panel that selected Nuiqsut subsistence users who were knowledgeable about harvest areas in the Colville River Delta, Fish and Judy creeks, and Kalikpik and Kogru rivers area. SRB&A conducted the interviews in conjunction with the Alpine Satellite Development Plan EIS.

**Scale: 1:1,250,000**

**Alaska Albers Equal-Area Conic projection**
**NAD27 Datum (Clarke 1866 Spheroid)**

Map Area

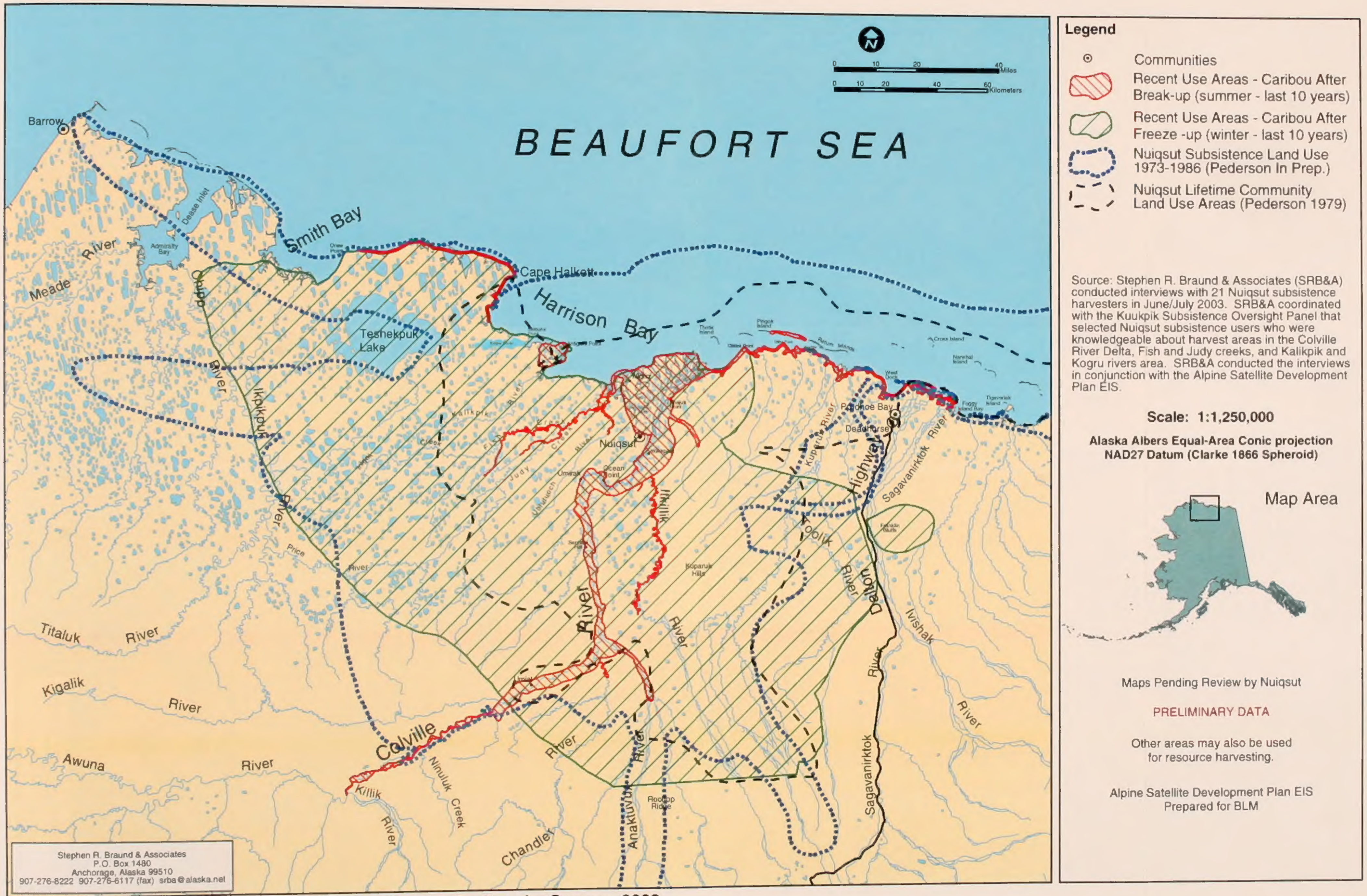
Maps Pending Review by Nuiqsut

PRELIMINARY DATA

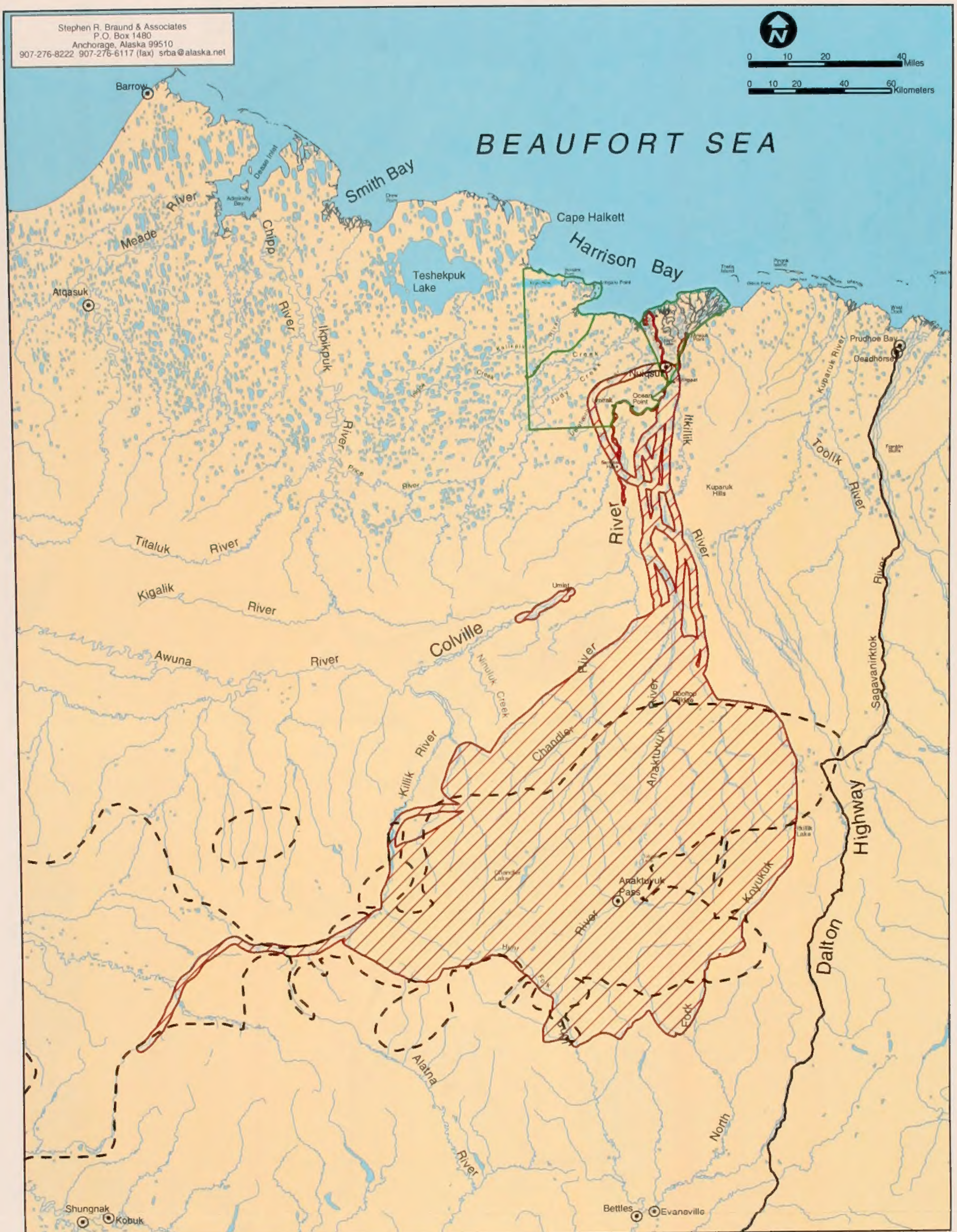
Other areas may also be used for resource harvesting.

Alpine Satellite Development Plan EIS
Prepared for BLM

**Map J-12. Nuiqsut Partial Subsistence Use Areas for Berries, Bowhead Whale, and Eider, 2003**




Map J-13. Nuiqsut Partial Subsistence Use Areas for Caribou by Season, 2003




Maps Pending Review by Anaktuvuk Pass

PRELIMINARY DATA

Other areas may also be used for resource harvesting.

Alpine Satellite Development Plan EIS
Prepared for BLM

**Scale: 1:1,500,000**

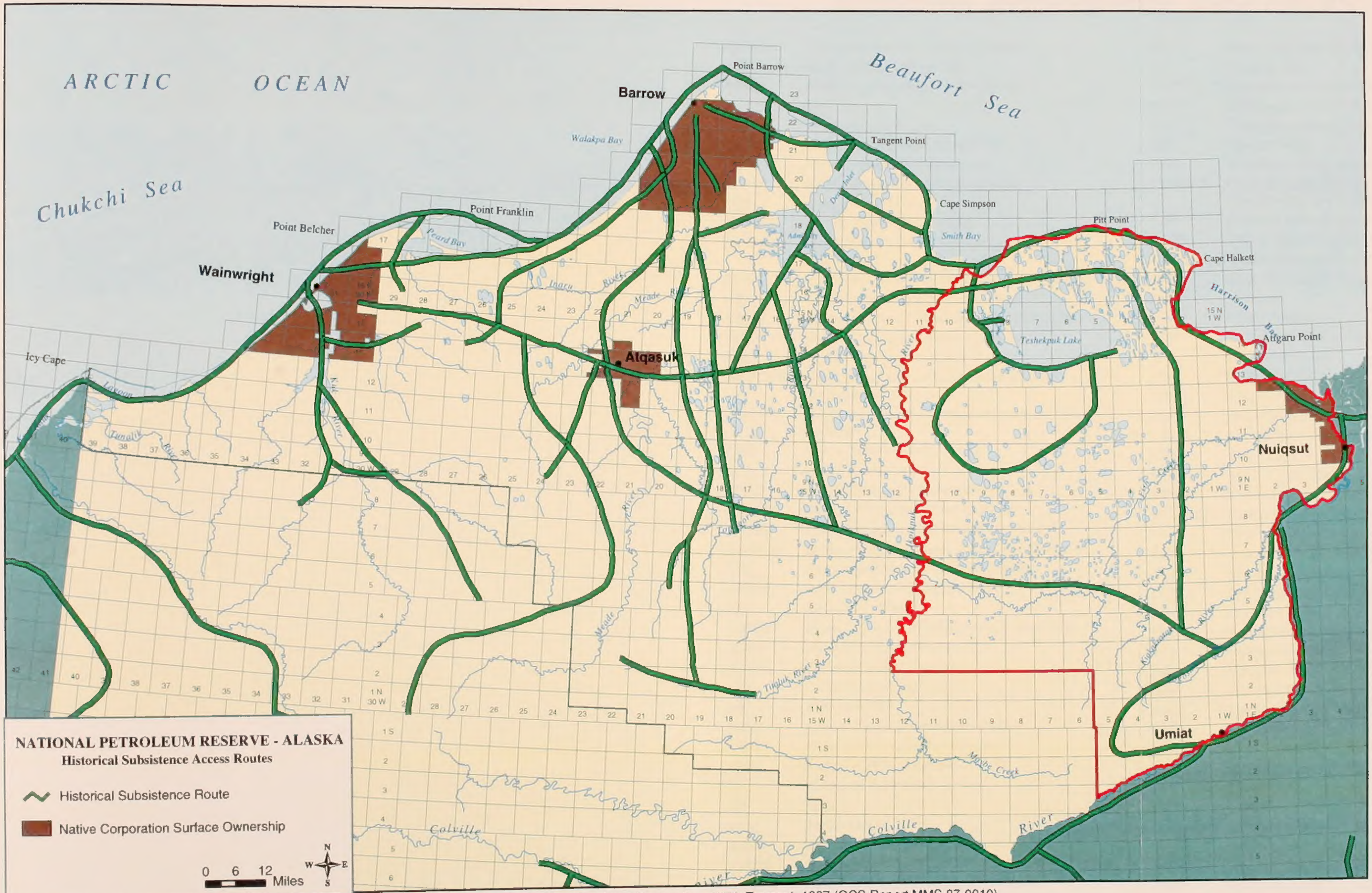
**Alaska Albers Equal-Area Conic projection**
**NAD27 Datum (Clarke 1866 Spheroid)**

**Legend**

- Communities
- Project Sub-areas
- Recent Use Areas - Multiple Resources (last 10 years)
- Anaktuvuk Pass Lifetime Community Use Areas (Pederson 1979)

Source: Stephen R. Braund & Associates (SRB&A) conducted interviews with 12 Anaktuvuk Pass subsistence harvesters in August 2003. SRB&A coordinated with the City of Anaktuvuk Pass that identified knowledgeable Anaktuvuk Pass subsistence users. SRB&A conducted the interviews in conjunction with the Alpine Satellite Development Plan EIS.

**Map J-14. Anaktuvuk Pass Partial Subsistence Use Areas for Multiple Resources, 2003**




Source: University of Alaska, Arctic Environmental Information and Data Center and Arctic Slope Regional Corporation, 1974; Tremont, 1987 (OCS Report MMS 87-0010)

**Map J-15. Historical Subsistence Access Routes on the North Slope**

# ACRONYMS, ABBREVIATIONS, AND SYMBOLS

| | |
|---|---|
| **AAAQS** | Alaska Ambient Air Quality Standards |
| **AAC** | Alaska Administrative Code |
| **AADT** | Annual Average Daily Traffic (count) |
| **ac** | acre |
| **ACI** | Alaska Consultants, Inc. |
| **ACIA** | Arctic Climate Impact Assessment |
| **ACMA** | Alaska Coastal Management Act |
| **ACMP** | Alaska Coastal Management Program |
| **ACP** | Arctic Coastal Plain |
| **AC&W** | Aircraft Control and Warning |
| **ADCED** | Alaska Department of Community and Economic Development |
| **ADEC** | Alaska Department of Environmental Conservation |
| **ADFG** | Alaska Department of Fish and Game |
| **ADGC** | Alaska Division of Governmental Coordination |
| **ADNR** | Alaska Department of Natural Resources |
| **ADOL** | Alaska Department of Labor |
| **ADOLWD** | Alaska Department of Labor and Workforce Development |
| **ADOTPF** | Alaska Department of Transportation and Public Facilities |
| **ADR** | Alaska Department of Revenue |
| **AGL** | Above Ground Level |
| **AHRS** | Alaska Heritage Resources Survey |
| **ANCSA** | Alaska Native Claims Settlement Act |
| **ANGTS** | Alaska Natural Gas Transportation System |
| **ANILCA** | Alaska National Interest Lands Conservation Act |
| **ANS** | Alaska North Slope; Arctic North Slope |
| **ANWR** | Arctic National Wildlife Refuge |
| **AO** | Authorized Officer |
| **AOGCC** | Alaska Oil and Gas Conservation Commission |
| **AQRV** | Air Quality Related Values |
| **ARCO** | Atlantic Richfield Company |
| **ARL** | Arctic Research Laboratory |
| **AS** | Alaska Statutes |
| **ASDP** | Alpine Satellite Development Project |
| **ASRC** | Arctic Slope Regional Corporation |
| **ASTt** | Arctic Small Tool tradition |
| **BA** | Biological Assessment |
| **bbl** | barrel |
| **Bbbl** | Billion barrels |
| **BCBS** | Bering-Chukchi-Beaufort Seas |
| **BD/DR** | Building Demolition and Debris Removal |
| **BEA** | Bureau of Economic Analysis |
| **BIA** | Bureau of Indian Affairs |
| **BLM** | Bureau of Land Management |
| **BP** | British Petroleum |
| **BPXA** | British Petroleum Exploration – Alaska |
| **CAA** | Clean Air Act |
| **CAFF** | Conservation of Arctic Flora and Fauna |
| **CAH** | Central Arctic Herd (of caribou) |
| **CCP** | Central Compressor Plant |
| **CD** | Colville Delta |
| **CEQ** | Council on Environmental Quality |
| **CERCLA** | Comprehensive Environmental Response, Compensation and Liability Act |
| **CFR** | Code of Federal Regulations |
| **CIAP** | Coastal Impact Assistance Program |
| **CIP** | Capital Improvement Project |
| **CIRI** | Cook Inlet Region Incorporated |
| **cm** | centimeter |
| **CM** | Cost of Mitigation |
| **CMP** | Coastal Management Program |
| **CO** | Carbon Monoxide |
| **$CO_2$** | Carbon Dioxide |
| **CPF** | Central Production Facility |
| **CRA** | Circumpolar Research Associates |
| **CRSA** | Colville River Special Area |
| **CWA** | Clean Water Act |
| **CZMA** | Coastal Zone Management Act |
| **DDT** | Dicholorodiphenyltrichloroethane |
| **DEW-Line** | Distant Early Warning Line (System) |
| **EA** | Environmental Assessment |
| **EEZ** | Exclusive Economic Zone |
| **EFH** | Essential Fish Habitat |
| **EIS** | Environmental Impact Statement |
| **EO** | Executive Order |
| **EPCA** | Energy Policy and Conservation Act |
| **ESA** | Endangered Species Act |
| **FEP** | Full Economic Potential |
| **FFD** | Full Field Development |
| **FLIR** | Forward Looking Infrared Radar |
| **FR** | Federal Register |
| **FLPMA** | Federal Land Policy and Management Act |
| **ft** | foot/feet |
| **FY** | Fiscal Year |
| **gal** | gallon(s) |
| **gal/day** | gallons per day |
| **GAO** | U.S. General Accounting Office |
| **GMU** | Game Management Unit |
| **GOR** | Gas-to-Oil Ratio |
| **GTL** | Gas-to-Liquid Ratio |
| **HRAF** | Human Relations Area Files, Inc. |

| | |
|---|---|
| **$H_2S$** | Hydrogen Sulfide |
| **IAI** | Impact Assessment, Inc. |
| **IAP** | Integrated Activity Plan |
| **ICAS** | Iñupiat Community of the Arctic Slope |
| **in** | inch |
| **IPCC** | Intergovernmental Panel on Climate Change |
| **IRA** | Indian Reorganization Act |
| **IRP** | Industrial Roads Program |
| **ISER** | Institute of Social and Economic Research |
| **km** | kilometer(s) |
| **$km^2$** | square kilometer(s) |
| **KOP** | Key Observation Point |
| **KRU** | Kuparuk River Unit |
| **LADS** | Light Automated Drilling System |
| **lb** | pound(s) |
| **$LC_{50}$** | lethal dose at which half of the organisms die |
| **LMR** | Land Management Regulation |
| **LNG** | Liquid Natural Gas |
| **LPG** | Liquefied Petroleum Gas |
| **LRR** | Long Range Radar |
| **LRRS** | Long Range Radar Site |
| **LUEA** | Land Use Emphasis Area |
| **m** | meter(s) |
| **$m^2$** | square meter(s) |
| **$m^3$** | cubic meter(s) |
| **Mcf** | Thousand cubic feet (of gas) |
| **Meq/l** | Milliequivalents per liter |
| **mg** | milligram(s) |
| **mg/l** | milligrams per liter |
| **mi** | mile(s) |
| **$mi^2$** | square mile(s) |
| **MMbbl** | Million barrels (of oil) |
| **MMbpd** | Million barrels per day (of oil) |
| **MMcfd** | Million cubic feet per day (of gas) |
| **MMPA** | Marine Mammal Protection Act |
| **MMS** | Minerals Management Service |
| **Mpa** | megapaseals |
| **M-SFMCA** | Magnuson-Stevens Fishery Management and Conservation Act |
| **MOU** | Memorandum of Understanding |
| **MWD** | Measurement while Drilling |
| **NA** | Not Applicable |
| **NAAQS** | National Ambient Air Quality Standard |
| **NARL** | Naval Arctic Research Laboratory |
| **NEPA** | National Environmental Policy Act |
| **NHPA** | National Historic Preservation Act |
| **NMFS** | National Marine Fisheries Service |
| **NO** | Nitric Oxide |
| **$NO_x$** | Nitrogen Oxides |
| **$NO_2$** | Nitrogen Dioxide |
| **NOA** | Notice of Availability |
| **NOAA** | National Oceanic and Atmospheric Administration |
| **NPDES** | National Pollution Discharge Elimination System |
| **NPR-A** | National Petroleum Reserve-Alaska |
| **NPRPA** | Naval Petroleum Reserves Production Act |
| **NRC** | National Research Council |
| **NRHP** | National Register of Historic Places |
| **NSB** | North Slope Borough |
| **NSBMC** | North Slope Borough Municipal Code |
| **NSMOG** | North Slope Management Oversight Group |
| **NSO** | No Surface Occupancy |
| **NSSI** | North Slope Initiative |
| **NWI** | National Wetlands Inventory |
| **NWS** | Northern Warning System |
| **$O_3$** | Ozone |
| **OCS** | Outer Continental Shelf |
| **OCSEAP** | Outer Continental Shelf Environmental Assessment Program |
| **OCSLA** | Outer Continental Shelf Lands Act |
| **OHA** | Office of History and Archaeology |
| **OHV** | Off-highway Vehicle |
| **ONR** | Office of Naval Research |
| **OPEC** | Organization of the Petroleum Exporting Countries |
| **ORV** | Off-road Vehicle |
| **OSC** | On-scene Coordinator |
| **OWM** | Oil-weathering Model |
| **PAH** | Polycyclic Aromatic Hydrocarbons |
| **PAI** | Phillips Alaska, Inc. |
| **PET-4** | Naval Petroleum Reserve Number 4 |
| **pH** | Measure of hydrogen ion concentration in the water |
| **PL** | Public Law |
| **PM** | Particulate Matter |
| **$PM_{2.5}$** | Particulate matter > 2.5 microns in diameter |
| **$PM_{10}$** | particulate matter > 10 micron in diameter |
| **POL** | Petroleum, Oil, and Lubricants |
| **ppb** | parts per billion |
| **ppm** | parts per million |
| **ppt** | parts per thousand |
| **PSD** | Prevention of Significant Deterioration |
| **RCRA** | Resource Conservation and Recovery Act of 1976 |
| **RFSUNY** | Research Foundation of the State University of New York |
| **RI/FS** | Remedial Investigation and Feasibility Study |

| | |
|---|---|
| **RMP** | Resource Management Plan |
| **RMT** | Research and Monitoring Team |
| **RN** | Roaded Natural |
| **ROD** | Record of Decision |
| **ROP** | Required Operating Procedure |
| **ROS** | Recreation Opportunity Spectrum |
| **ROW** | Right-of-Way |
| **SAP** | Subsistence Advisory Panel |
| **SHPO** | State Historic Preservation Officer |
| **$SO_x$** | Sulfur Oxides |
| **$SO_2$** | Sulfur Dioxide |
| **SQRU** | Scenic Quality Rating Unit |
| **SPM** | Semi Primitive Motorized |
| **SRBA** | Stephen R. Braund and Associates |
| **SRP** | Special Recreation Permit |
| **SRR** | Short Range Radar |
| **SRRS** | Short Range Radar Site |
| **TAGS** | Trans Alaska Gas System |
| **TAPS** | Trans-Alaska Pipeline System |
| **TAPSO** | Trans-Alaska Pipeline System Owners |
| **Tcf** | Trillion cubic feet (of gas) |
| **TEA** | Transportation Enhancement Act |
| **TERA** | Troy Ecological Research Associates |
| **TLCH** | Teshekpuk Lake Caribou Herd Area |
| **TLH** | Teshekpuk Lake Herd (of caribou) |
| **TLUI** | Traditional Land Use Inventory |
| **TVD** | True Vertical Depth |
| **UAA** | University of Alaska, Anchorage |
| **UIC** | Ukpeagvik Innpiat Corporation |
| **UL** | Unavailable for Leasing |
| **USC** | United States Code |
| **USACE** | U.S. Army Corps of Engineers |
| **USDOC** | U.S. Department of Commerce |
| **USDOD** | U.S. Department of Defense |
| **USDOE** | U.S. Department of Energy |
| **USDOI** | U.S. Department of Interior |
| **USDOL** | U.S. Department of Labor |
| **USEPA** | U.S. Environmental Protection Agency |
| **USFWS** | U.S. Fish and Wildlife Service |
| **USGCRP** | U.S. Global Change Research Program |
| **USGS** | U.S. Geological Survey |
| **VOC** | Volatile Organic Compounds |
| **VRM** | Visual Resource Management |
| **VSM** | Vertical Support Member |
| **WAC** | White Alice Communications |
| **WACS** | White Alice Communication System |
| **WAH** | Western Arctic Herd (of caribou) |
| **WSR** | Wild and Scenic Rivers |
| **WSRA** | Wild and Scenic Rivers Act |
| **yd** | yard(s) |
| **$yd^3$** | cubic yard(s) |
| **Y-K Delta** | Yukon-Kuskokwim Delta |
| $\geq$ | greater than or equal to |
| $\leq$ | less than or equal to |
| $>$ | greater than/more than |
| $<$ | less than |
| **$\mu g/m^3$** | micrograms per cubic meter |
| **°F** | degrees Fahrenheit |